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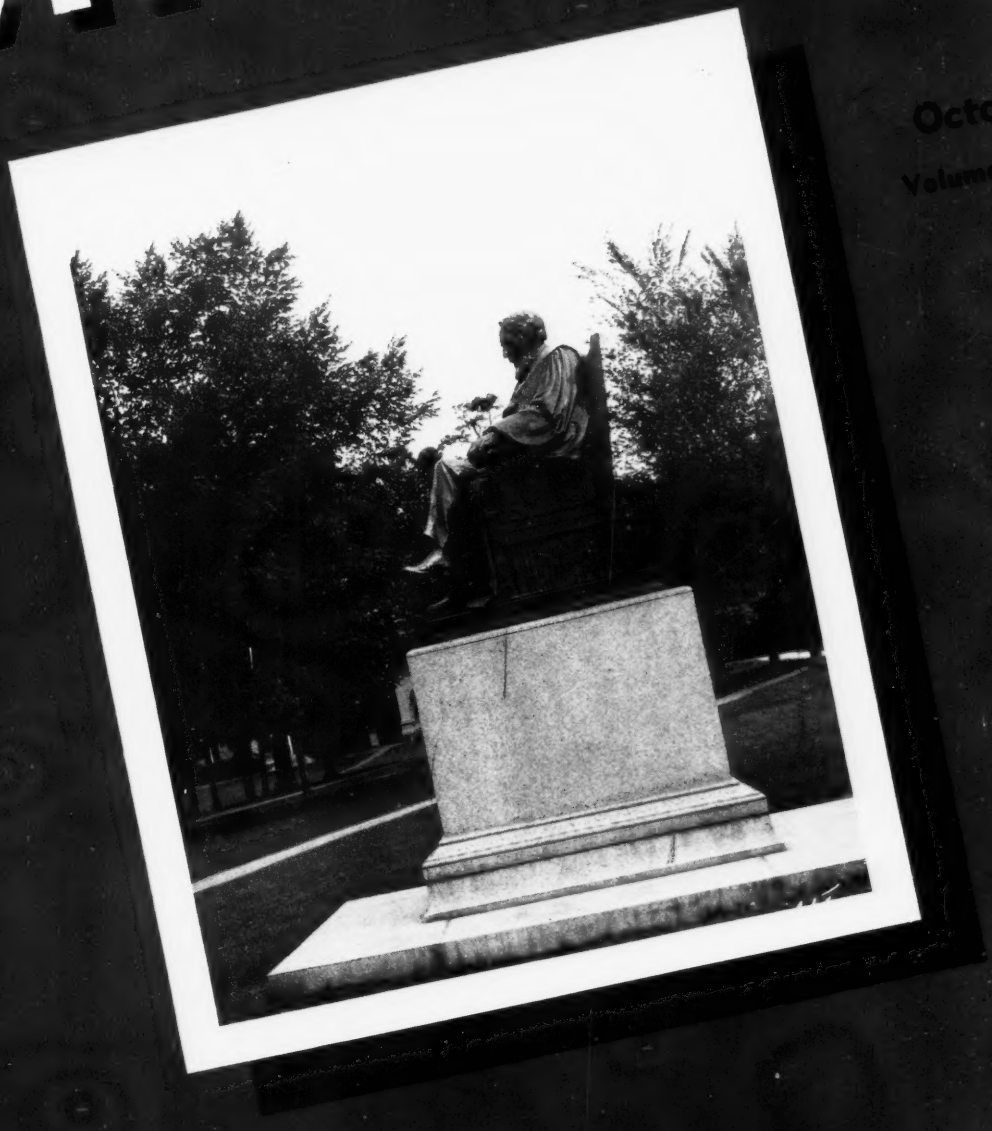

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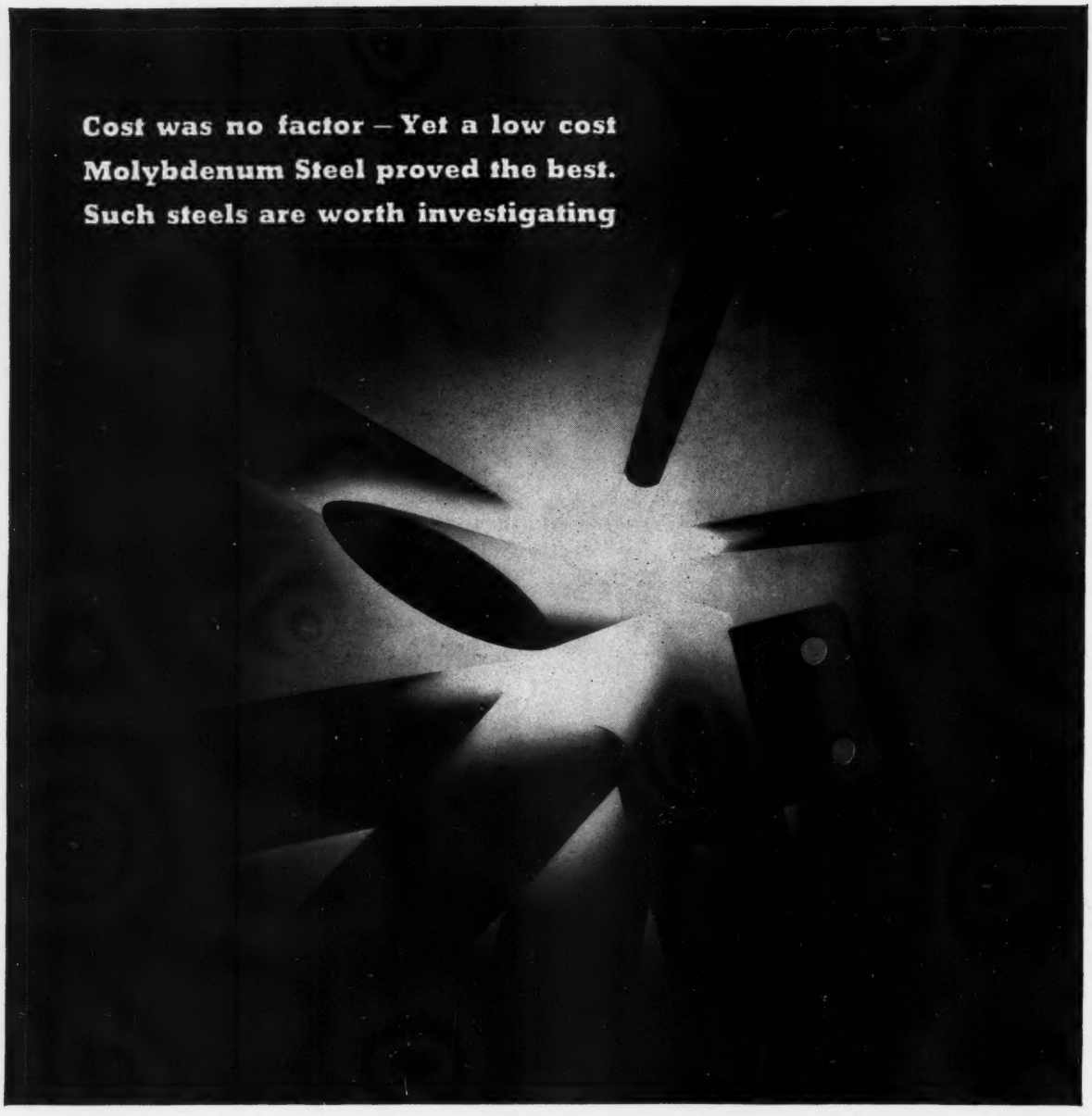

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Frontispiece: Looking toward the dorms from the Library Tower.

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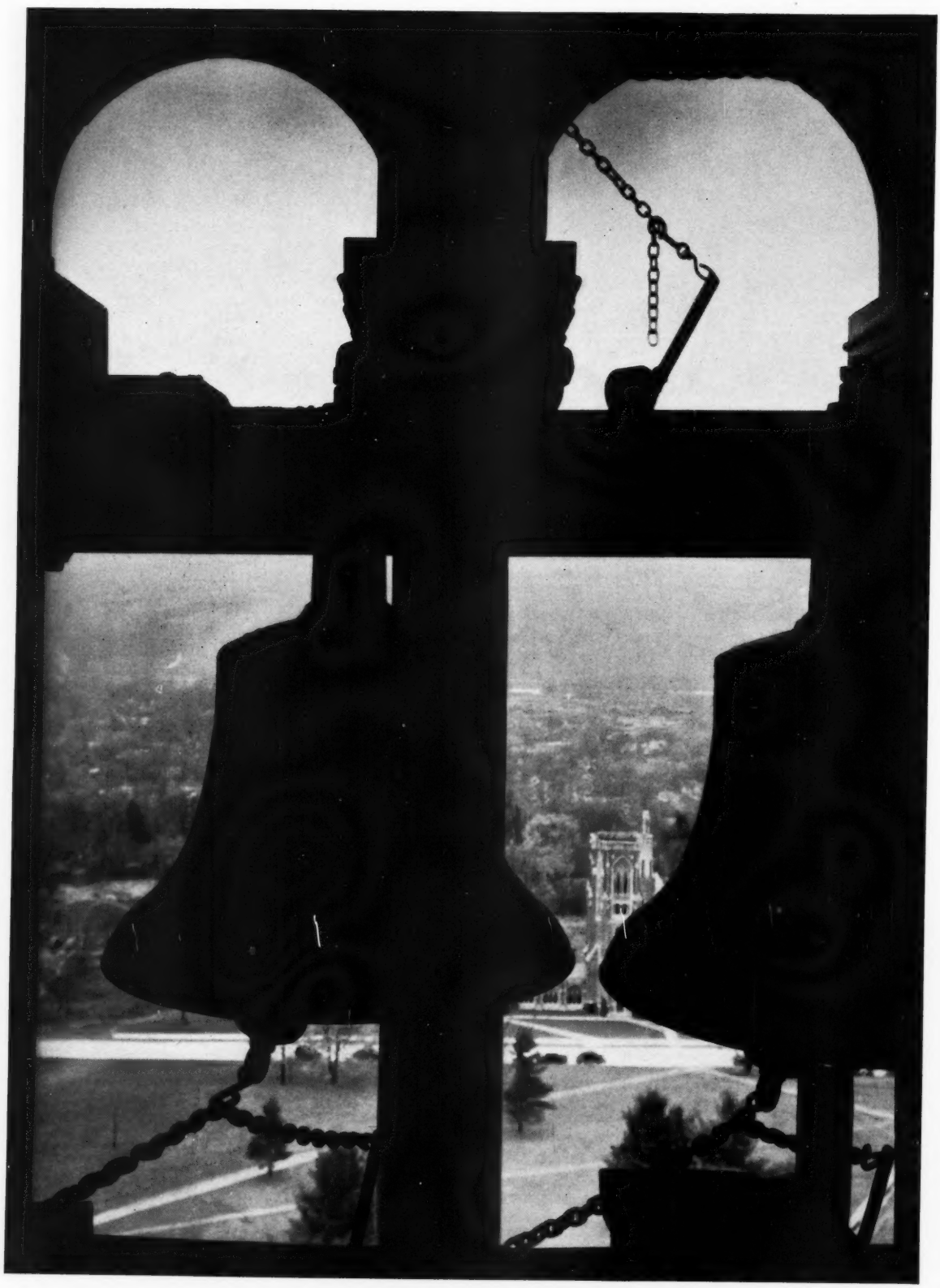


"Music with the twilight falls . . ."

Why the Dollar-a-Year Man In Defense?

DEXTER S. KIMBALL

Dean Emeritus of the College of Engineering

FROM the many inquiries I have heard there would appear to be much misunderstanding and some misinformation covering this class of public servant. As a matter of fact, the reasons for his presence are very simple, if somewhat lengthy to describe.

In times of peace the Army is charged with the duty of keeping active the nucleus of an armed force that can be expanded quickly. It is also expected to keep abreast of new developments in arms and ammunition, and to guard our coast with large guns and fortifications. For these purposes the Army possesses certain facilities of its own, such as the plant for making large guns at Watertown and several other arsenals where small arms are manufactured. There are also a few privately-owned rifle plants that can be utilized if necessary. The extent of these activities is limited, of course, by Federal appropriations. The Federal appropriation for the Army for the year 1941 made before the great defense program started was $441,212,619.

The Navy, subject also to Federal appropriation, is expected in times of peace to build and maintain a Navy that will adequately protect our shores and overseas possessions. The task would, no doubt, be simpler if we did not possess these latter, but we are committed at present to include them in the problem. A Navy is a large and costly organization, including battleships, heavy cruisers, light cruisers, destroyers, repair ships, hospital ships, tankers, transports, etc. For the construction of naval vessels the Navy possesses many facilities of its own, such as the shipbuilding yards at Portsmouth, Brooklyn, Norfolk, Philadelphia, Charleston, Mare Island in California, and Bremerton in Washington. The Navy also has a great gun plant in Washington, D. C. The appropriation for the Navy for the year 1941 prior to the beginning of the defense program was $633,389,-021.

The growth of our Navy is quite indicative of the problems we face today. The first iron ships owned by the United States were the cruisers *Chicago, Atlanta, Boston,* and *Dolphin.* The respective displacements of these ships were 4000, 3000, 3000, and 1500 tons. All four were built by John Roach at Chester, Pa., in 1884 at a cost for the four of $2,440,000. The writer as a young man worked on the construction of the engines of the cruiser *Charleston,* 3500 tons, built at the Union Iron Works at San Francisco in 1888. The design for this ship was bought in England. A modern battleship will have about 50,000 tons displacement, will require about four years to build, and will cost about $60,000,000.

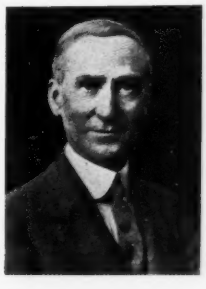
Furthermore, modern science and invention have changed radically all methods of making war. Much of this change has been due to the internal combustion engine that has made possible the tank and the airplane. The modern big gun is accurate within a range of about twenty miles and our largest bombers can fly 500 miles carrying 36,000 pounds of explosives and return without refueling. We are, therefore, very much closer to Europe, and Europe by the same token is very much closer to us than even a year ago.

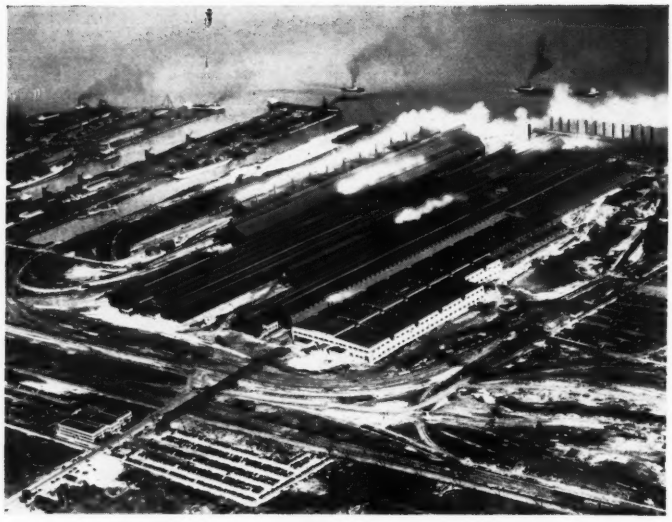
We have come a long, long way, therefore, in a comparatively few years from the idea that going to war meant taking down grandfather's old musket from the wall and going to the front or embarking in a wooden sailing ship armed with smooth-bore cast-iron cannon that were effective for only a few hundred yards. Modern warfare is highly scientific, highly mechanized and requires manufacturing facilities of extraordinary size and accuracy. It is somewhat ironic that the manufacturing methods that have made possible the automobile, the radio, the refrigerator, and numberless comforts of everyday life were used first by Eli Whitney to make muskets in quan-

DEXTER S. KIMBALL first came to Cornell University in 1898 as assistant professor of machine design. After teaching for several years he left to take a job in industry, returning in 1904 to continue teaching as professor of machine design. During the years that followed he served as professor of machine design, of construction, and of industrial engineering, and during the period from 1920 to 1936, served as Dean of the College of Engineering. He was Acting President of Cornell University from July to October of 1918 and from November, 1929, to February, 1930.

Author of many outstanding engineering texts, he is also noted for his ability as a lecturer. He has held a number of very important positions on many committees and societies, among them the presidency of the Society for the Promotion of Engineering Education, presidency of the ASME, presidency of the local chapter of Phi Kappa Phi, and membership in Sigma Xi and Tau Beta Pi.

Dean Emeritus Kimball is at present serving on the Priorities Board of the OPM in Washington as chairman of the committee on machine tools.





Industry rallies to the nation's defense.

tity for the Northern armies during our Civil War.

When therefore the Congress voted 60 billions of dollars to put this country into a good state of defense and to give aid to Great Britain, it launched a program that engaged not only all Army and Navy facilities to the fullest capacity but made it necessary to call upon private industry to participate in the production of war material to a much greater degree than ever known in history. Automobile plants are making tanks; many commercial plants are making rifles, pistols, and ammunition; aircraft plants are being rapidly expanded and are working night and day. New factories of many kinds are being built, often with the aid of the Federal government. All existing shipyards are running at full capacity and more are being built. The Maritime Commission is pushing the construction of merchant craft. A shortage in many metals due to this gigantic program makes necessary the expansion of plants to produce steel, aluminum, tungsten, etc., and makes necessary also the restriction of the use of these and many other commodities so far as civilian use is concerned. In reversal of the biblical idea, we are literally beating our plowshares into swords and other weapons of a most violent nature.

It is in this picture that the "dollar-a-year" man makes his appearance. Obviously, only the Army and Navy officials can tell us what ships, guns, tanks, and ammunition should be made. They, and they alone, have the information necessary to lay out the basic program of rearmament. For this purpose the Army and Navy Munitions Board has been created. It consists, as may be inferred, of ranking Army and Navy men. This board has the authority to place prime contracts with private manufacturers and to direct the efforts of government yards and plants. Up to the present, prime contracts for approximately $15,000,000,000 worth of munitions have been so placed by this board. Perhaps the most efficient procedure would be to give this board full power over the entire program as organizations now have in totalitarian countries. But this country is still a democracy and it should be remembered that we are not at war—as yet. Therefore, to take up the terrific impact of the armament program upon private industry and to supervise the vast production program set in motion by Army and Navy contracts, the President organized the so-called Office of Emergency Management. There are about thirteen committees and offices under this administrative group. Without doubt the most important of these is the Office of Production Management. A fair idea of the quality and character of dollar-a-year men can be had from the leading personnel of this group as originally constituted. At its head are William Knudsen, president of General Motors, and Sidney Hillman, labor leader, as co-directors. Under these there are three divisions, namely, Priorities, Purchases, and Production. The first was headed originally by Edward R. Stettinius, chairman of the Board of U. S. Steel Corp.; the second by Donald Nelson, chairman of the Executive Committee, Sears, Roebuck and Co.; and the third by John Biggers, president of Libby - Owens - Ford Glass Co.

Under these heads are twenty-three "commodity sections," each devoted to a single commodity such as rubber, tin, machine tools, etc., the assignment to the divisions being made on the consideration of which of the three problems, priority, purchase, or production is most important. All priority rulings, however, must clear through the Director of Priorities. At this writing there are nearly 200 dollar-a-year men in various capacities in these commodity sections. One estimate states that the Government gets the equivalent of over two million dollars worth of service in this manner.

OPM vs. OPACS

Under the Office of Emergency Management there was also established the Office of Price Administration and Civilian Supply (OP ACS). The original intent, apparently, of this office was to control prices and material supplies other than those assigned to direct defense. The relation of this office to the OPM was never clearly defined and there has been considerable misunderstanding and some acrimonious debate between the two groups simply because of lack of definition as to purpose. Quite recently the OPACS was consolidated into the OPM and renamed the Office of Price Administration. A new super-board known as the Supplies Priorities and Allocation Board was created with Vice-President Wallace as chairman and Donald Nelson as executive director. The board includes Secretaries Knox and Stimson and Messrs. Knudsen, Hillman, Harry L. Hopkins, and Price Administrator Henderson. This board will establish general policies and allocate mater-

(*Continued on page* 20)

Gasoline Storage: A Hazard

CHARLES O. MACKEY, M.E. '26
Professor of Heat Power Engineering

Expert witness in Jamestown fire trial explains why horizontal storage should be legally restricted

Professor C. O. Mackey

ONE common method of storing motor gasoline in the bulk distributing plants of the various oil companies is to use horizontal cylindrical tanks placed above ground. Many such tanks will be seen in driving along the main motor routes of New York State; these tanks are usually found in large numbers near the outskirts of the cities. Gasoline is also stored in underground tanks and in vertical tanks above ground, but this article deals with the horizontal above-ground tank. Without proper precautions in its construction and venting, the horizontal gasoline storage tank may become a serious menace to property and human life in time of peace, and in time of war the danger will be much greater.

Necessity for Adequate Ventilation

When a fire starts under one of these tanks, the storage vessel becomes a gasoline still or a gasoline boiler. If the tank is suitably designed and adequately vented, the gasoline vapor formed by the heat transfer from the flames to the tank escapes from the vent, ignites upon reaching the air, and burns harmlessly but with a roaring flame that leaps vertically many feet above the tank. If the tank is not suitably designed and adequately vented, the formation of gasoline vapor within the tank may build up the internal pressure to such a point that rupture of the tank occurs; liquid gasoline then spurts from the tank, catches fire, and burns everything in its path.

The Jamestown, New York, gasoline storage fire of June 18, 1934, is an illustration of what happened once and of what might still happen in any of a number of places in this state and in others. In this fire of 1934, four firemen and three spectators were burned to death, several people were critically burned, and a hundred or more suffered minor burns. As a sad comment on the ability of people to learn from one unfortunate experience, there is a possibility of the results of this disastrous fire being repeated now, seven years later, within one-half mile of the site of the previous fire. Without any attempt to fix the blame, the facts of this holocaust may prove of some interest to engineers and laymen.

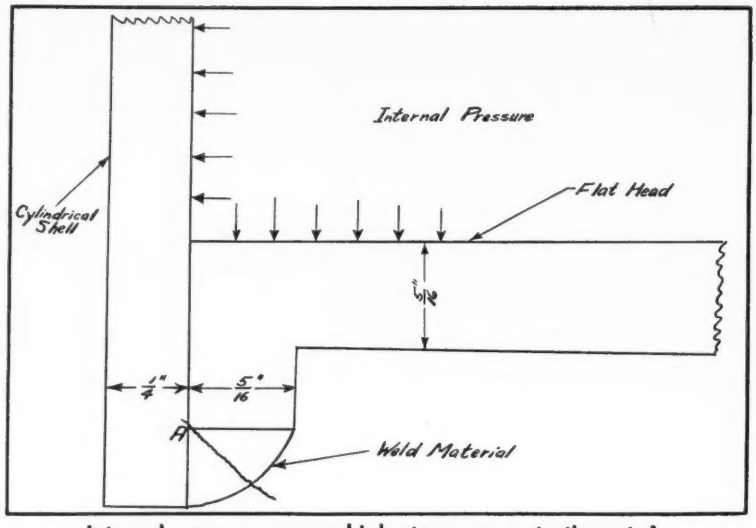
PROFESSOR C. O. Mackey was graduated from Cornell University in 1926; originally enrolled in the class of '25, teaching in the experimental engineering department during his junior and senior years forced him to spread his senior courses over two years. After graduation he continued teaching in the same department until 1927, when he transferred to the heat power department. Advancing rapidly, he was made assistant professor in 1929 and in 1936 became full professor.

Professor Mackey's teaching has been supplemented by several years of experience in industry with Eastman Kodak and the Carrier Corporation; he has also written several texts that are being widely used in the teaching of air conditioning and graphical computations.

The Explosion

There were three horizontal, cylindrical storage tanks involved in the Jamestown fire. All three tanks were supported on concrete cradles with the bottom of each tank about two feet above the ground. The tanks were parallel and about three feet apart. The northerly tank had a capacity of 20,000 gallons and was of heavy, riveted construction with bulged heads. The middle tank was 8 feet in diameter by 22 ft. 4 in. long with a steel shell ¼ in. thick and flat steel heads 5/16 in. thick welded to the shell; this tank had a capacity of 8000 gallons, and at the time of the fire is believed to have contained about 6000 gallons of gasoline. The southerly tank was 10 feet in diameter by 34 ft. 2 in. with a ¼ in. steel shell and welded, flat steel heads 5/16 in. thick; this tank had a capacity of 20,000 gallons, and at the time of the fire is believed to have contained about 6,000 gallons of gasoline. Welded to the inside of each flat head were three parallel 5 in. 9 lb. channels. These stiffening channels did not extend to the shell but stopped several inches short of the outer periphery of the head.

On each tank there was a nominal 2-in. vent; this vent had a minimum clear area for the flow



Internal pressure causes high stress concentration at A.

of vapor of 2.94 square inches. Each vent was of the duplex type (internal pressure is relieved during filling of the tank by allowing escape of the air-vapor mixture, and internal vacuum is relieved during emptying of the tank by allowing the inflow of air.) Each vent was equipped with a removable screen to prevent back flash of flame into the tank.

The following facts concerning the fire are taken from the testimony at the coroner's inquest. A truck driver pulled his tank truck up next to the pump house, which was a small structure between the two large tanks and one foot west of the smaller, center tank. He removed the dome from one tank compartment, put in the fill pipe, reached in the window of the pump house, closed the pump switch and drew some gasoline. He then closed the flow valve, turned off the pump switch, went into the pump house and changed the valve to draw ethyl gasoline. He next undomed another compartment, put in the fill pipe, and closed the pump switch. The driver was next knocked to the ground by a mild explosion (the driver is reported as saying that he didn't think it was an explosion which blew him off the truck, but rather a sort of a puff, which felt like a blow in the stomach from the flat of a hand). When he got up from the ground, the pump house was full of flames, so the driver moved his truck away. Gasoline was then flowing from the broken fill pipe and burning under the storage tanks. Witnesses do not agree exactly upon what happened next, but the following description is approximately correct.

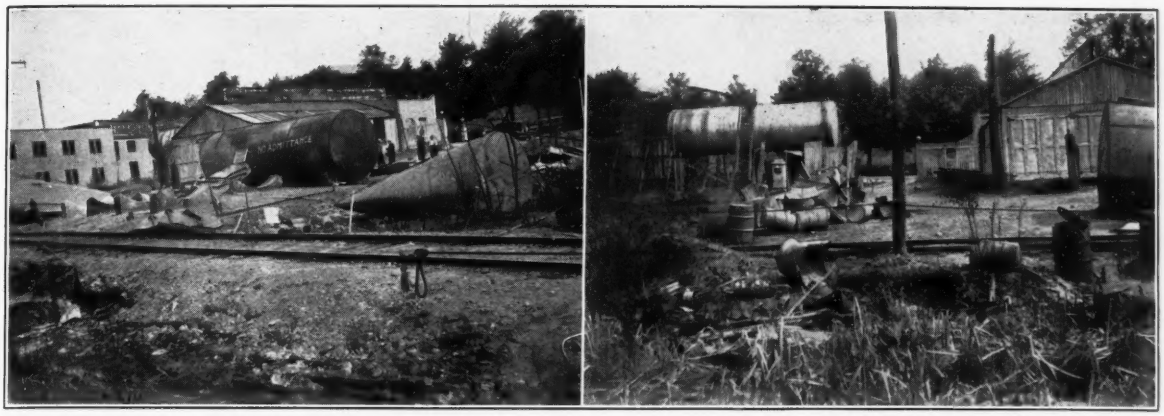
About twenty to thirty minutes after the fire started, the west head of the center tank tore loose from the shell at the weld and was thrown about 40 ft. while the shell of the tank with the east head in place was blown off the cradle about 40 ft. east of its original position. A few seconds or minutes later, the east head of the southerly tank tore loose from the shell at the weld and was thrown about 20 ft., while the shell with the west head intact was blown about 40 ft. off the cradle. All four firemen manning an easterly hose line were caught in the wave of blazing gasoline from this tank and burned to death, two instantly. Three onlookers were burned to death and many other firemen and spectators were severely burned.

High-powered rifles were used to puncture the east head of the northerly tank, and 33 bullet holes were counted in this head after the fire. This tank was equipped with a manhole screwed in place in a cast iron ring. Apparently one of the rifle bullets struck the cast-iron ring and split it, for a few minutes after the rifle fire ceased the manhole cover blew off relieving the pressure in this tank which did not rupture. Due to the heavier construction and bulged ends, it is doubtful if this tank would have ruptured even if the rifle bullets had not punctured the head or if the manhole cover had not blown off, because the bullets were not fired until nearly two hours after the start of the fire.

The Case for Local Supervision

There is grave doubt in the mind of the author as to whether horizontal tanks should be used at all for the storage of gasoline above ground. If they are used, the public should be protected against a real hazard by adequate local ordin-

Bulged head of north tank that did not fail.



Views of wreckage after fire. Note shells of tanks blown from supports and heads of both tanks near center of left picture.

ances based upon sound engineering principles. These principles are simple and well known, and it is unsafe to ignore them. The structural design of the tank and the emergency venting problem go hand in hand and cannot be separated. By leaving the structural problem to the tank manufacturers, local ordinances may still be written in such a way that the public is protected. Any ordinance regulating the storage of gasoline in horizontal tanks above ground should consist, at least, of the following three *requirements*: (1) that the tanks be tested before use with a prescribed hydrostatic pressure; (2) that emergency vents provide a clear area at the top of the tanks for the vertical flow of gasoline vapor adequate to keep the internal pressure well below the prescribed test value in the event of a large fire under the tank; (3) that the tanks be mounted on concrete cradles or on steel supports fireproofed with concrete. The National Fire Protection Association has published a suggested ordinance regulating the use, handling, storage, and sale of flammable liquids which covers some of these necessary points. In addition to requiring that all new tanks meet the requirements of carefully worded ordinances, the design and venting areas of all tanks now in use should be immediately checked.

Adequate Ventilation Necessary

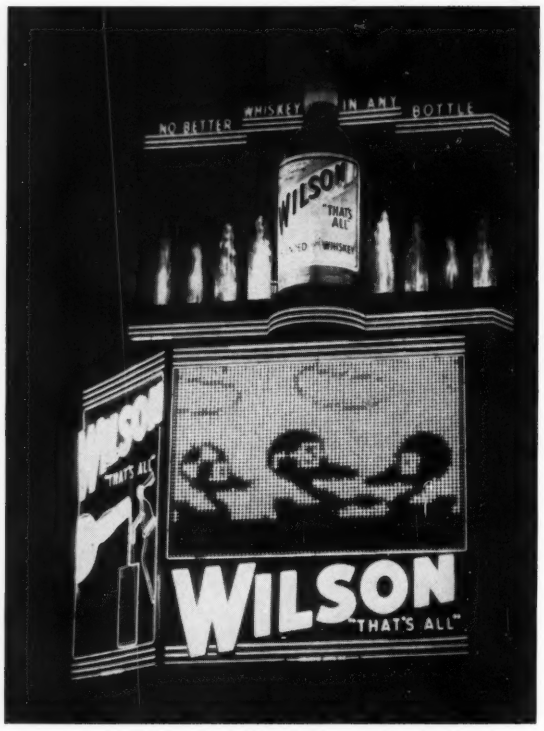
The venting problem involves many interesting, fundamental principles in heat transfer and fluid flow. The general problem is to select a venting area which will keep the internal pressure down to a prescribed limit during an exposure fire. To solve this problem requires a knowledge of the rate of vapor formation and the rate of vapor flow through the vent. The rate of vapor formation depends upon (1) the rate of heat transfer to the liquid inside the tank, (2) the distillation characteristics of that liquid. The approximate rate of heat transfer from an exposure fire to the surface of the tank must be known. The distillation characteristics of gasoline may be obtained, and the rate of vapor formation calculated on the basis of a steady rate of heat transfer per sq. ft. of wetted surface. The rate of vapor formation will be found to pass through a maximum some time after the start of the fire when approximately 50 per cent of the gasoline has been vaporized. From the laws governing the flow of gasoline vapor through a restricted opening, the vent may then be sized to permit the flow of this vapor at a rate equal to the maximum rate of vapor formation and at a safe internal pressure.

A Solution of the Problem

Obviously steps should have been taken by engineers and city officials to prevent the recurrence of a disaster like the Jamestown fire, but actually very little has been done. It is not the purpose of this article to discuss the structural design of gasoline storage tanks. The Jamestown tanks, as well as many other storage tanks now in use, were poorly designed to withstand internal pressure; however, it should be realized that there are now, and there were in 1934, many gasoline storage tanks in use of good structural design and with adequate vents. In the Jamestown tanks, the shell projected slightly beyond the flat heads; the periphery of the heads was then bent outward, placed against the shell, and the weld material applied on the *outside* as shown in the accompanying sketch. A high concentration of stress in the weld material apparently caused failure of that material at a fairly low internal pressure. This is no criticism of the welds, for they behaved as might be predicted; it is, however, a criticism of the design. If flat heads are to be used in storage tanks, the structural problem needs further study.

In Conclusion

This brief discussion may indicate the nature of the structural and venting problems involved in the safe storage of gasoline. It does not purport to give all the answers, but the hazard is real enough to warrant more careful study than has yet been given it by engineers and civil authorities responsible for the safety of the public. Storage of gasoline without attention to these fundamental principles subjects the public to an unnecessary hazard in times of peace, and particularly in times of sabotage and national emergency. Furthermore, safe storage involves trifling expense; large vents on each storage tank at Jamestown would undoubtedly have saved the lives of seven people.



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HAVE you ever seen a picture enlarged 100,000 times? You have if you're one of the millions of passers-by who have paused in their rush through New York's Times Square to gaze at one of the animated cartoon electric signs which give new vivacity to the Great White Way.

"Epok" is the trade name for these animated cartoon signs. It was invented by Kurt Rosenberg, an Austrian, and the American rights to it were acquired in 1937 by Douglas Leigh, Inc., who has since erected a million dollars' worth of signs around Times Square.

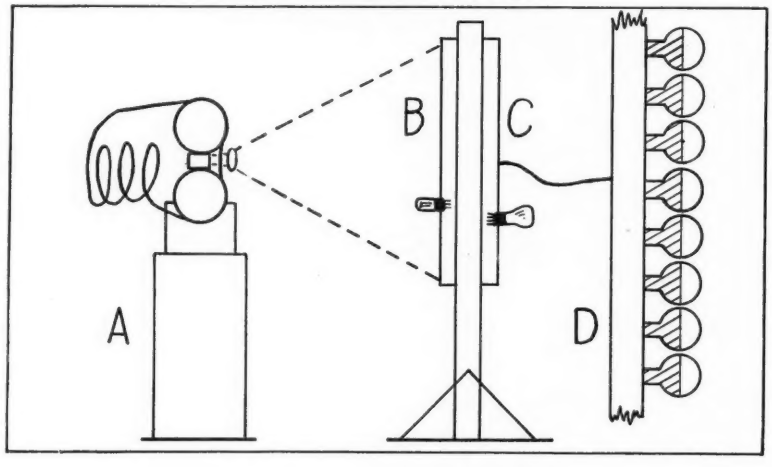
Basically, the process is quite simple. A new story, designed by professional gag men and cartoonists, such as Otto Soglow, creator of "The Little King," is first laid out in black and white squares on special, non-shrinking paper—one drawing for each progressive movement. As many as twenty drawings are used for one motion, such as a fisherman withdrawing his line from a river. The entire five-minute story requires 2000 separate pictures. The hardest part of this drawing, called "animation," is to register facial expression with the black and white squares. The animator frequently gets ideas by looking into a mirror and making various expressions with his own face. Three experienced animators are regularly employed to create new stories, which are renewed monthly. Each drawing is then photographed on one frame of a 16 mm. motion picture film. When the film is projected at twenty to twenty-four frames per second, the figures appear to move. So far, except for the using of only squared black and white figures, we have simply followed the process of making an ordinary movie cartoon.

Instead of projecting the movie on a conventional screen, however, it is projected on a bank of tiny photoelectric cells. Each cell is connected to a separate grid control rectifier tube which in turn controls one of the corresponding separate lamps in the twenty-one by thirty-one foot lamp bank in the sign outside. If a negative film is used, the picture appears on the sign in lights. Usually a positive film is used; the background appears in lights and the unlighted parts make the picture.

Diagrammatic Explanation

Figure 1 shows diagrammatically what has just been explained. *A* represents the continuous wind mo-

Figure 1. Diagram of the sign



tion picture machine which projects the image from a distance of thirty to forty feet. Figure 2, a view of this projector, shows the endless film being adjusted on its circle of small pulleys which permit it to run continuously. In this way the five minute cartoon repeats itself automatically from sundown to 1:00 a. m. every night.

B in Figure 1 represents the photocell bank on which the pictures are projected. Epok is the largest user of photoelectric cells in the world today. Great improvements have recently been made in the cells, largely because they are extensively used in warfare. They are smaller and more sensitive, so that now they can flash a bulb on and off twenty times a second. There are fifty-four cells in each vertical row and seventy-six in each horizontal row.* Absolutely straight rows are imperative so that the film characters projected on the photocell bank will not be distorted. Figure 3 shows how the projected cartoon appears on the photocell bank. Notice how the shadow figures lie along the lines of the photocell rows. That is why the original drawings were made in squares.

C in Figure 1 represents the thyraton (grid control rectifier) tubes, nicknamed trigger tubes, which bridge the gap between the tiny currents in the photocells and the comparatively large currents in the twenty-four-watt bulbs in the sign outside. These tubes have three electrodes and contain mercury vapor. The photocell is connected in the filament-grid circuit, while the sign lamp bulb is connected in the filament-plate circuit. Ionization of mercury vapor, which permits the bulb to light, occurs at or over a certain grid potential, which in turn is controlled by a photocell. Moreover, the lamp-plate current can pass in only one direction; i.e., if the plate is positive with respect to the filament. After the plate current has once started, the grid cannot stop or control it. However, an alterating current is used for the plate e.m.f. This is rectified by the tube as explained above and has the effect of regularly deionizing the vapor. Therefore, at each cycle the grid determines whether or not the current can flow to the lamp again. In this way the photoelectric current, of the order of millionths of an ampere, can control the lamp current of the order of amperes.

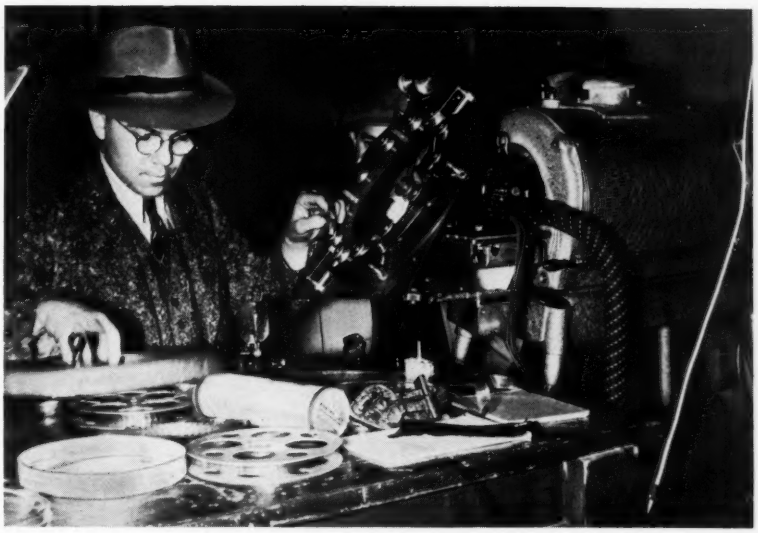


Figure 2. The projector

The incandescent bulbs in the sign itself, represented at *D*, are silvered on the back half, both to increase their lighting efficiency and to define more clearly the line between the lighted and unlighted bulbs.

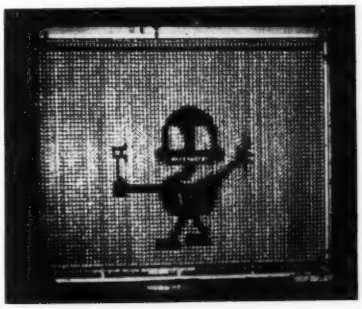


Figure. 3. Image on photocells

Previous Epok signs used one photocell to each four bulbs on the screen outside, but the newest sign uses one cell to each lamp. Therefore it is not limited to squared pictures, but can give enough detail so that rounded figures can also be used. This technique makes it possible to project 16 mm. shots of actual people on the sign. It is necessary, however, that the characters be photographed in front of a lighted screen to give a silhouette effect. Recently Fred Astaire and Rita Hayworth were thus seen dancing on the sign.

At the formal premiere of this sign Al Jolson, one of the celebrities present, discovered that by passing through the light beam of the sign's projector and casting his shadow on the bank of photocells, he appeared "in person" in lights on Broadway. Other stars followed his example, each doing some stunt in the light beam to the delight of the curbstone audience.

Some Interesting Facts

These Epok signs spout big numbers. For example, the Wilson "spectacular" (as these giants are called by the trade) has 10,000 lamps, 4,104 of which are in the animated cartoon bank, and 100 miles of wiring. It takes 200,000 watts, enough to light every lamp in Hackensack, N. J. The Old Gold sign at 43rd St. and Broadway cost $27,000 to build and has a yearly electric bill of twice that amount. The Epok process reminds one curiously of television, but while a television image is enlarged to about five by seven inches, the Epok sign totals 93,000 square inches—an enlargement of over

(*Continued on page 22*)

* These figures refer to the newest and most elaborate Epok sign—the Wilson Whiskey sign at 46th Street and Broadway.

The COLLEGE . . .

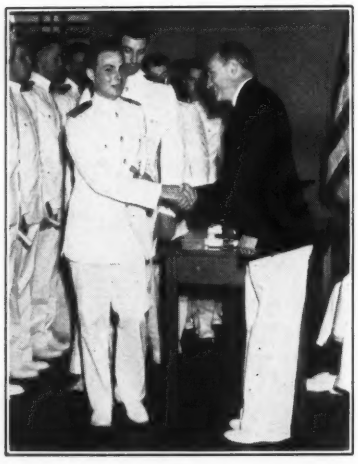
Navy on the Hill

WHEN school closed last spring, there were some 47 ensigns taking courses in Diesel engineering in the College. When school opened this fall there were still about the same number of Navy men on the Hill, but these are not the same men, for on July 18, an impressive ceremony was given to mark the completion of the 16 weeks' training course. It was on July 6 that the second group of ensigns began their 16 weeks' trek.

The graduation ceremony was done up in fine style: Dr. Adams awarded the graduates certificates and Captain Paul P. Blackburn, U. S. Navy, retired, Director of the Naval Reserve, Third Naval District, flew from New York to address the Navymen.

The first group to receive Diesel training at Cornell, the ensigns, with a few exceptions, have all been placed on duty on ships for which their training was especially planned. The men were sent to posts in widely separated waters of the western hemisphere.

The course, which was specially arranged by Cornell University in



Dr. Adams awards certificate

cooperation with the Navy Department, was sponsored by the U. S. Office of Education. The 47 ensigns, after their preliminary three months' training at sea, came to Cornell in March. Their training was directed by Prof. A. C. Davis, of the College of Engineering, and a corps of assistants from the regular staff. Three additional faculty members were loaned by industry. Combining practical and theoretical instruction, the course required one-day-a-week study at the Diesel plant of the American Locomotive Works at Auburn. Sections of the group made the trip to Auburn daily, by bus. At Auburn, the Ensigns worked under the supervision of Harte Cooke, nationally recognized authority on Diesel engines.

The men were housed largely in University buildings and were accorded all the recreational and social privileges of the University. Five ensigns besides their certificates acquired wives during the 16-week period. Two were married in Sage Chapel with full Navy ceremony.

The new group of ensigns have already completed more than half of their training and are already looking forward to graduation which will take place on October 24. In addition to the instruction received by the first group, this unit is receiving instruction in the traditions and customs of the Navy, with some military drill and other basic training necessary for naval officers, under the direction of Ensign Charles W. Frey, who remained in Ithaca as commanding officer of the unit. It will be interesting to note what effect the presence of Cornell co-eds will have on the number of marriages performed in Sage Chapel on and after October 24.

Faculty Activities

FOR the first time in the history of Cornell's College of Engineering, the title of Associate Professor has been awarded. This position ranks between that of professor and assistant professor. The men who have earned this new title are:

School of Chemical Engineering —PROFSSORS CHARLES C. WINDING and OSCAR J. SWENSON.

School of Civil Engineering—PROFESSOR EARLE N. BURROWS.

School of Electrical Engineering —PROFESSORS LAWRENCE A. BURCKMEYER, JR., MICHEL G. MALTI, and EVERETT M. STRONG.

School of Mechanical Engineering—PROFESSORS PAUL H. BLACK, STEPHEN F. CLEARY, GEORGE R. HANSELMAN, WARREN H. HOOK, JOSEPH O. JEFFREY, and JOHN R. MOYNIHAN.

Other Promotions

In addition to his position as director of Extramural Courses, DR. ARTHUR S. ADAMS has been advanced from assistant to the dean to the position of assistant dean.

DR. J. N. GOODIER, head of the

Competition Notice

On Wednesday, October 1st, our fall competitions are being opened to freshmen and sophomores, leading to positions on our editorial and business staffs.

Freshmen: In order to realize the most out of college life it is essential that you get into some extra-curricular activity which will permit you to make new friends and learn how to work with others toward a common end. You will not only gain valuable knowledge, but you will make contacts with the alumni, professors, and eminent students in the engineering school. The new program inaugurated by the engineering college, in which staff and board members of **THE CORNELL ENGINEER** will receive University credit and also the benefit of competent instruction in journalism and business methods, should in itself urge you to come out for this competition.

Sophomores: Cornell is no longer strange to you—you are fully aware that this is the last year in which you can get into an activity, make yourself eligible for honorary societies. It is still not too late to take advantage of this excellent opportunity.

The Dean's Welcome to the Class of 1945

THE present crisis has greatly increased public awareness of the importance of industry; and people are beginning to understand the vital role played by engineers in making industry and natural resources work effectively for the national welfare. America respects and relies upon the engineering profession as never before.

To you who are entering the College of Engineering at Cornell with the Class of 1945, this public trust means a serious responsibility. Your motives in training yourself to enter this profession now include a duty to your country as well as a duty to yourself. You cannot be satisfied with mediocrity. Your responsibility is to develop yourself to the limit of your capacity.

There is a further reason for making the most of your opportunities in Ithaca—one that will grow on you with the years. You are not merely an engineer, but a Cornell engineer, a member of a body of more than 15,000 men with high traditions and a record of significant achievement. I am confident that you will carry on that tradition and make Cornell engineers an even more powerful force in solving the tremendous problems that lie ahead.

Dean Hollister

Department of Mechanics in the Sibley School of Mechanical Engineering, was given the additional title of head of the Department of Mechanics in the School of Civil Engineering.

At press time for this issue, the complete lists of faculty changes have not been announced. See the November issue of the ENGINEER for the completed lists.

New Professorships

The appointment of Professor FRANK O. ELLENWOOD, head of the department of heat-power engineering in the Sibley School of Mechanical Engineering, to the John E. Sweet Professorship in Mechanical Engineering was announced by President Edmund E. Day of Cornell University. This distinguished professorship in the College of Engineering was established in 1927 from gifts by friends and associates of the late Professor Sweet, in memory of his achievements as one of the pioneers in engineering. The chair was held by the late Dean Herman Diederichs of the College of Engineering from 1928 to his death in 1937.

The chair to which Professor Ellenwood has been appointed is named for one of the noted members of Cornell's early faculty in engineering. A teacher in the Sibley College of Mechanical Engineering from 1873 to 1879, Professor Sweet contributed as a pioneer to the development of manufacturing, especially in raising standards of accuracy, was a leader in founding the American Society of Mechanical Engineers, designed and manufactured the Straight-Line Engine, and won fame as an inspiring educator. The fund for a professorship in his honor was suggested shortly after his death in 1916 and was completed by gifts from former students and associates and other engineers in all parts of the world.

A new professorship, established in the honor of Herbert Fisk Johnson, late president of S. C. Johnson & Son, Inc., was awarded to PROFESSOR F. H. RHODES. The Director of the School of Chemical Engineering is the first holder of the chair.

On Leave of Absence

PROFESSOR WILLIAM E. STANLEY of the School of Civil Engineering has a leave of absence for one year to accept the position of chief of the sewerage and incineration group in the office of the Quartermaster General.

Professor Stanley's responsibilities will include establishing standards of design and specifications for construction projects, supervising the preparation of preliminary studies and complete designs for such projects, giving necessary instructions to consulting architect-engineers in the field, making field investigations and cost analyses, previewing prospective sites for new projects, and maintaining contact at all times with zone engineers and architects. He was selected for the position by Col. James W. Younger of the office of the Quartermaster General after a thorough canvass of all available engineers with the special qualifications for the work.

In order to serve as chief of the Special Engineering and Design Group of the Civil Engineering Unit in the office of the Quartermaster General in Washington, leave of absence has been granted to L. C. URQUHART, professor of structural engineering in the School of Civil Engineering, President Edmund E. Day announced during the summer.

Professor Urquhart's duties include passing on all special structures, such as bridges, docks, wharves, piers, and foundations which will be built by the Army. He also will check estimates sent to Washington from the various corps areas, and make recommendations on patented construction features suggested for inclusion in specifications.

Into the Naval Research Laboratory goes PROFESSOR T. R. CUYKEN-

(*Continued on page 28*)

The ALUMNI . . .

Alumnus Wins Medal

DR. ANSON MARSTON, dean emeritus of the engineering division of Iowa State College and an alumnus of the School of Civil Engineering at Cornell University in 1889, was awarded the Lamme Medal for accomplishment in technical teaching and advancement of the art of technical training, at the annual convention of the Society for the Promotion of Engineering Education in Ann Arbor. Of the 14 winners of this gold medal since it was first awarded in 1928, four others besides Dean Marston have been connected with Cornell.

Previous Recipients

Second winner of the medal, in 1929, was I. P. Church, emeritus professor of applied mechanics and hydraulics at Cornell. In 1931 Dugald C. Jackson of M.I.T., who did graduate work in engineering at Cornell in 1885 and 1886, was the winner. In 1933 the medal went to Dean Emeritus Dexter S. Kimball of the College of Engineering, and in 1937 to Dean Frederick E. Turneaure of the University of Wisconsin, who took his C. E. degree at Cornell in 1889.

The current recipient, Dr. Marston, became professor of civil engineering at Iowa State College in 1892, dean in 1904, senior dean and research engineer with the engineering experiment station in 1932, and dean emeritus in 1937. He has been chairman of the State Highway Commission of Iowa, a member of the Inter-Oceanic Canal Board, the Mississippi River Engineering Board of Review, and the American Engineering Council, president of the American Society of Civil Engineers, the American Society for Testing Materials, and the Association of Land-Grant Colleges, and a member of numerous other scientific and academic societies. He is also widely known as a research worker and consulting engineer.

Mead Receives Scroll

DANIEL W. MEAD, a graduate of the School of Civil Engineering at Cornell University in 1884, was awarded a testimonial scroll as a "civil engineer, teacher, leader in applied hydraulics, and pioneer hydrologist" by representatives of the Section of Hydrology of the American Geophysical Union, the Civil Engineering Division of the Society for the Promotion of Engineering Education, the Committee on Hydrology of the American Society of Civil Engineers, and the Pennsylvania State College, which sponsored the 1941 Hydrology Conference. Presentation of the scroll was made at the conference dinner at State College, Pa., on June 30.

Dr. Mead, who is professor emeritus of hydraulic and sanitary engineering at the University of Wisconsin, has had a distinguished career as an educator and consultant. In 1941 he was a member of the Commission of the Red Cross and Chinese Republic for Flood Protection of the Huan River; from 1913-1920 was consulting engineer of the Miami Conservancy District; and in 1928 was appointed by President Coolidge to the Colorado River Board to pass on plans for the Boulder Canyon Project.

Dr. Mead accepts testimonial

He also reported for the chief of the U. S. Army Engineers on the foundations of Muscle Shoals Dam, and is chairman of the Board of Review of the Chicago Sanitary District for the PWA.

He is the author of numerous books, including "Water Power Engineering", "Contracts and Specifications," and "Hydrology," and has presented many papers on a variety of engineering subjects. His active educational service, all at the University of Wisconsin, extended from 1904 to 1931.

Among the honors Dr. Mead has received are the Chanute Medal from the Western Society of Engineers for the best paper presented in 1913, and the Washington Award "for preeminent service in advancing human progress" from five national engineering societies in 1939. He also holds the Norman Medal of the ASCE and the Fuertes Medal from the School of Civil Engineering at Cornell. In 1936, when Dr. Mead came to Ithaca as president of the ASCE, the faculty of the School of Civil Engineering at Cornell presented him a unique scroll congratulating him on his professional achievements.

The Priestley Award

THOMAS MIDGLEY, JR., a graduate of the College of Engineering at Cornell University in 1911, who is vice-president of the Ethyl Gasoline Corporation, recently received the Priestley Medal, highest honor bestowed by the American Chemical Society. Although he is still suffering from the effects of infantile paralysis, which attacked him a year ago, Dr. Midgley appeared at the Atlantic City meeting to receive the honor, and gave from a wheelchair a scientific demonstration of recent advances in chemical science in which he himself has played an important role.

By means of a gasoline engine, chemical apparatus, motion pictures and lantern slides, Dr. Midgley demonstrated the effect of antiknock material in a running engine; the non-toxic, non-inflammable properties of certain organic fluorides largely responsible for a great portion of the air-conditioning industry; the experiments through which he and his associates discovered that rubber containing oxygen could be vulcanized by the addition of certain reagents and the process of commercially extracting bromine

from sea water.

Dr. Midgley's discovery in 1922 of tetra-ethyl lead as an anti-knock agent was made after he and his colleagues in the General Motors Research Laboratories had tried more than 33,000 different chemical compounds without success.

Editorial Lauds Midgley

The *New York Times*, in an editorial on the award, recalled that Joseph Priestley "laid the foundation for the modern science of gases and their reactions," and continued, "It is fitting, therefore, that this year's recipient of the Priestley Medal, the highest honor offered by the American Chemical Society, should be a man who made it possible for automobiles and airplanes to go many miles farther on a gallon of 'gas'. In 1922, when Thomas Midgley, Jr. announced that six years of work at the General Motors Research Laboratories had culminated in the perfection of an anti-knock compound, he predicted: 'Within the next two or three years it is expected that gas-engine design will have been changed to get the benefit of the new discovery.'

"The prediction has been abundantly fulfilled. The modern high-compression automobile engine, not to speak of the much more compact airplane motor, would sputter painfully with the kind of fuel that was marketed twenty years ago. To keep the same number of cars on the road and airplanes on the wing (and they would never fly as fast as they do), would require many more tankers, tank-cars, and pipelines from the Western fields. For the present efficiency of the internal combustion engine the nation owes much to Dr. Midgley. And for the very existence of such engines there is an enduring debt to pioneers like Joseph Priestley, the Nonconformist minister who learned about gas-chemistry from the froth of a beer vat."

Dr. Midgley is a winner of the Nichols medal of the society's New York section and of the Perkin medal of the Society of Chemical Industry. Wooster College conferred on him the honorary degree of Doctor of Science. He is a member of the Engineering College Council at Cornell and has been active in furthering the program to augment the resources of the College of Engineering.

BANCROFT GHERARDI, M.E. '93, of Shorthills, New Jersey died of a heart attack on August 16 while on a vacation near Sudbury, Ontario. Mr. Gherardi was 68 years old.

His career as an engineer has been intimately connected with the growth of the communication systems of the world. Following an advanced course of study at Cornell, Mr. Gherardi went to work for the New York Telephone Company as an engineering assistant to learn the fundamentals of the business. From this beginning, he rose to the position of chief engineer and then to the vice-presidency of the American Telephone and Telegraph Company. He held this position for a period of 18 years previous to his retirement in 1938.

In recognition of his services, Mr. Gherardi received the Edison Medal for 1932 and was honored by the receipt of the emblem of the Fourth Order of the Rising Sun from the Emperor of Japan. Among his many activities were included: Alumni Trustee of the University; president of the AIEE; author of numerous technical papers; and member of numerous committees.

Senior Employment

THE placement record of the June class of 1941 in the College of Engineering is given here. The data is based upon records available as of June 27.

ADMINISTRATIVE ENGINEERS

Adams, S. S.	U.S.N.R.
Antrim, J. C.	Panama Canal
Berry, F. R.	American Can Co.
Brown, M. L.	Continental Mills, Inc.
Brown, R. B.	Scovill Mfg. Co.
Brunet, R. D.	Service
Cole, G. E.	General Electric Co.
Easter, J. M.	Standard Oil Co. (Ohio)
English, C. O.	Bethlehem Steel Co.
Fellows, O. B.	Fair Play Caramels, Inc.
Flickinger, W. C.	Lincoln Electric Co.
Gifford, P. W.	Army Air Corps
Hart, W. D.	Long Lines, American Telephone and Telegraph Co.
Hillsley, F. R.	Continental Mills, Inc.
Hillsley, J. J.	Ingersoll-Rand Co.
Hooper, L. G.	Bethlehem Steel Co.
Kaighin, H. E.	American Welding Co.
Kelley, A. E., Jr.	Aluminum Co. of America
Kiehle, W. D.	Eastman Kodak Co.
Kilian, R. E.	Kilian Mfg. Co.
Kiligas, D. C.	Service
Kirk, W. W.	General Electric Co.
Knight, R. N.	U. S. Army, R.O.T.C.
Kruse, R. W.	U.S.N.R.
Lake, C. W.	U. S. Army, Ordnance Dept.
Lanman, T. W.	U.S.N.R.
Lenderman, C. S.	Hercules Powder Co.
Lynah, J. H.	U. S. Army, R.O.T.C.
McKinney, S. B.	U.S.N.R.
Nixdorff, F. S.	Consolidated Gas, Electric Light, and Power Co.
Pennock, A. P.	Carnegie-Illinois Steel Corp.
Potter, F. N.	U.S.N.R.
Reahard, R. M.	Purdue Univ., Grad. Work
Riday, J. T.	Cutler-Hammer Inc.
Riggs, E. W.	General Electric Co.
Robinson, J. H.	Firestone Tire & Rubber Co.
Rohn, N. F.	U. S. Army, R.O.T.C.
Ross, R. C.	U. S. Army, Signal Corps
Schadler, R.	U.S.N.R.
Serrell, V. E.	Glenn L. Martin Co.
Shoemaker, W. G.	Army Air Corps
Shreve, T. C.	U. S. Army, R.O.T.C.
Sinon, F. W.	U. S. Army
Sorn, W. W.	General Electric Co.
Spicer, E. F.	U. S. Army, Ordnance Dept.
Tuska, M. B.	U. S. Army, Quartermaster Corps
Vanderwaart, P. D.	Babcock and Wilcox Tube Co.
Voneiff, L. E.	Hercules Powder Co.
Vreeland, G. W.	U. S. Army, R.O.T.C.
Wetherill, R.	U.S.N.R.
Wetzel, H H.	U. S. Army, Ordnance Dept.

CHEMICAL ENGINEERS

Crom, J. M.	E. I. duPont deNemours & Co.
Fahnoe, F.	Dow Chemical Co.
Gentes, G. A.	Chas. Pfizer Co.
Goehring, C. C.	Standard Oil Co. of Calif.
Griffin, E. L.	Chas. P. Cochrane Co.
Gumbinner, R.	
Jacobs, D. B.	E. I. duPont deNemours & Co.
Lazare, L.	
Lawrence (Levine), E. A.	Colgate-Palmolive-Peet Co.
Ludington, R. S.	University of Michigan, Graduate Work
McCutcheon, W.	Socony-Vacuum Oil Co.
Ogden, R. P.	Sharples Solvent Corp.
Pressing, R. W.	S. C. Johnson & Sons, Inc.
Robinett, J. M.	E. I. duPont, Ammonia Division
Rutherford, J.	Hooker Electro-Chemical Co.
Wardwell, E. A.	Imperial Paper & Color Co.

(*Continued on page 26*)

Use The Cornell University Placement Bureau

WILLARD STRAIGHT HALL — H. H. WILLIAMS, '25, Director

Class of 19

MEET YOUR A

Professor O'Rourke

Civil Engineers

BACK in Ithaca after a six-months' sojourn at Honolulu and the world famous beach at Waikiki, Professor Charles E. O'Rourke, in addition to resuming his teaching of structural engineering will serve as adviser to the CE freshmen. Hawaii was not all swimming and deep-sea fishing, however, for he taught at the University of Hawaii as a visiting professor of structural engineering. But more about Hawaii later.

After graduating from Cornell University with a C.E. degree in 1917, Professor O'Rourke was an engineer in the Tennessee Inspection Bureau at Nashville. In 1919 he turned to teaching, serving first as instructor, then as assistant professor, and in 1935 he became a full professor of structural engineering. Although connected with the Cornell faculty ever since he started teaching, he served as a visiting professor of structural engineering at Carnegie Tech in 1921 and in a similar capacity from 1926 to 1927 at the Imperial Peiyang University, a Chinese government engineering school at Tientsin.

Other experience, not in the teaching line, he obtained by working as a designer and estimator for the Concrete Steel Company of New York City during the summers from 1920 to 1926. "Summer vacations" in subsequent years (1932 to 1934) found him serving as engineer for the Finger Lakes State Parks Commission, and since that time he has been consulting engineer for the Grange League Federation, better known to local folk as the G.L.F. In addition to these undertakings, he has himself written six widely used handbooks and structural engineering texts.

Professor O'Rourke has had his share of honors too. Member of Tau Beta Pi, Chi Epsilon, Pyramid, Gargoyle, and the American Concrete Institute, he is also at present a member of the faculty committee of presentation and awards.

While at Hawaii this past spring, Professor O'Rourke had an opportunity to examine the dry-dock construction at Pearl Harbor—a privilege denied the public during these days of feverish military and naval effort. He gave a talk to the Honolulu branch of the ASCE on the Tacoma bridge failure, and he also addressed the Honolulu

(*Continued on page* 30)

Administrative Engineers

FRESHMEN in AE will find as their adviser, Dr. T. Arthur Ryan, an instructor in psychology and personnel management, who will guide them through their four years at Cornell.

Dr. Ryan

Dr. Ryan was born in Batavia, New York, and there he spent his pre-college days. In 1929 he entered Cornell University and was graduated from the College of Arts and Sciences in 1933 with an A.B. degree. He continued his study here and in 1937 received his Ph.D. Since then he has been teaching psychology in the arts college.

A year ago Dr. Ryan was transferred to the College of Engineering to enable him to conduct research on the psychological aspects of time and motion study—a subject in which he is extremely interested, for it has an important bearing on industrial psychology. While not engaged in research, he taught some courses in personnel management to AE students. His hobby along academic lines is statistics (a course with which you freshmen will become acquainted next year), and he also likes to play with math. In more relaxed moments you might find him trying his hand at amateur carpentry, reading good literature, exploring the pleasures of music (he was in the University orchestra and musical club while an undergraduate), or playing with his one-year-old son. Incidentally, it was while seeking his Ph.D. that he met the girl who was later to be his wife; she also received her Ph.D. from Cornell in 1937.

Chemical Engineers

FRED H. Rhodes, energetic Director of the School of Chemical Engineering and Johnson Professor of Industrial Chemistry, will serve as adviser for freshman chem engineers. Known on the engineering campus as "Dusty", he received his A.B. degree from Wabash College in 1910 then majored in chemistry at Cornell University, where he obtained his Ph.D. in 1914.

While at Cornell, Professor Rhodes served as an assistant in chemistry, and after receiving his Ph.D. went out to the University of Montana, where he was instructor in chemistry from 1914 to 1915. The two years that followed found Professor Rhodes back at Cornell as an instructor in qualitative analysis. He gave up teaching in 1917

lass of 1945

OUR ADVISERS

Professor Rhodes

to obtain some experience in industry as director of research in the chemical department of the Barrett Company, manufacturers of coal tar products, resuming his teaching at Cornell in 1920 as professor of industrial chemistry, in which capacity he served until 1933, when he became professor of chemical engineering.

Since 1938 Professor Rhodes has been Director of the School of Chemical Engineering and last spring he was awarded the Johnson Professorship of Industrial Chemistry.

He has done a great deal of consulting work since 1920, and in addition to holding about 15 patents on chemical engineering processes he has written about 60 journal articles on technical subjects in chemical engineering. He is also the author of two books, "Patent Law" and "Technical Report Writing"—which is in press at this time—and is a member of Tau Beta Pi, Sigma Xi, Phi Kappa Phi, and Phi Beta Kappa.

When not directing the activities of the ChemE School, Professor Rhodes enjoys fishing, hunting, and canoeing. He wants all freshmen to drop in at his office and get acquainted.

Electrical Engineers

FRESHMEN in EE, if you will shortly meet Associate Professor Michel G. Malti, your class adviser for your four years at Cornell. To you who are meeting him for the first time, his cordial manner and friendly smile will most deeply impress you. And soon you will learn that he will stand by you faithfully and go out of his way to help you provided you play fair and square; if you don't— Professor Malti has a highly developed sense of justice and a respect for honesty.

Professor Malti was born in Syria and when of age attended the American University at Beirut, from which he was graduated with an A.B. degree in 1915. World War I did not affect him, for Beirut is located in a section of Syria which formerly represented the only Christian region in the entire pre-war Ottoman Empire, and this section of Syria remained neutral during hostilities. During the period following graduation till the U. S. entered the war in 1917, he worked in the office of the American Consul General at Beirut.

In 1920 he came to the U. S. and decided to study engineering at

(*Continued on page 22*)

Professor Malti

Professor Erdman

Mechanical Engineers

SEEING the world first hand has been the keynote in Professor Erdman's career. The first seventeen years of his life were spent in Sidon, Syria, where his parents were Presbyterian missionaries. He frequently camped on Mount Olympus and in the Lebanon Mountains during the summer and used their steep slopes for skiing in the winter.

During the period after the British had pushed the Turks and Germans out of Syria in the World War, he worked for the American Red Cross. The war over, the Erdman family moved to America after an exciting voyage on a freighter from Egypt to London and a lucky passage on an ocean liner filled with returning troops.

Professor Erdman learned American ways during his year at Mercersburg, followed by four busy years at Princeton where he was on the crew and a member of the glee club. He learned to appreciate the value of his education by working both summer and winter to help himself through.

After graduating from Princeton in 1924 with a B.S. degree, Mr. Erdman went back to Syria, where he taught physics and general science for a year in the American University of Beirut. Returning to America, he took his engineering at M.I.T. A year's practical experience with a pump company in Cincinnati fitted him for the position

(*Continued on page 22*)

CORNELL SOCIETY OF ENGINEERS

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"The objects of this Society are to promote the welfare of the College of Engineering at Cornell University, its graduates and former students and to establish a closer relationship between the college and the alumni."

President's Message

Fellow Cornellians:

This, my first letter as president of your Society, is addressed to all Cornellians, but more particularly to the undergraduates who form a very important part of the Society's membership. A long time ago a wise man asked a question, "What came ye here to do?" I wonder how many of you have asked yourself this question and what answers you have made. Let's talk about it a little.

Never in the history of the world has there been such a demand for men who can do things—do things with their hands, do things with their minds, do things with their money. This demand is constantly growing as we pass from one crisis to another. Engineers fall naturally into the second group, and you undergraduates will immediately answer the query by saying that you came to Cornell in order to train your minds to do things in engineering. How are you improving the opportunity which presents itself? Are you going through the motions of attending classes and laboratory periods, writing prescribed reports, taking examinations, and then asking one another how you made out? Are you conceiving that the major thing which you have to do is to get a passing mark in each subject? Are you undertaking to realize that what you should be doing in fact is not the memorization of things which you find on the printed page, or which you hear from the lecture platform, or which you see in demonstrations, but rather by practice and observation to train your own mind to think out problems which will be brought to you or which you may meet after you have left the University, and when you may be a long distance from instructors and even text or reference books?

It seems difficult to impress students with the basic idea which they should have in mind when pursuing the course which they have chosen—that is, that they will be rewarded in the future in direct proportion to their ability to think, and to think straight. Too often one meets engineers, who have posed as such for many years, who cannot do more than recite some of the formulae which they have memorized, and who, when called upon for something original, find it impossible to produce anything of real value.

If one does think, then it is necessary that the result of the thought be expressed in some tangible form, either by the written or spoken word. Here is where engineers for years have been woefully lacking. The press of time, the urge to be doing something, the necessity, imagined or real, of packing into four short years all that can be done in the sciences, either pure or applied, applicable to the course chosen, has crowded into the background or eliminated something vastly more important. There was a time when a student entered engineering schools completely (?) trained in the use of the English language and cultural subjects, and there were many curricula which

(*Continued on page* 20)

As the new President of the Cornell Society of Engineers, C. Reeve Vanneman will be the author of this page for the coming year.

As a student at Cornell, he was a member of Pyramid, editor-in-chief of the Year Book of the College of Civil Engineering, and member of Cum Laude, an undergraduate honor society. Since his graduation in 1903 with the degree of C.E., his engineering experience has included engineer for the Pennsylvania Railroad; chief examiner of the State Civil Service Commission of New Yor'x; engineer for the Barge Canal; twenty-one years with the Public Service Commission, serving as chief engineer for ten years; ten years as a consultant.

He is the member of many societies including the ASCE, New York State Society of Professional Engineers (past president of the Albany Chapter), Tau Beta Pi, and the Albany Society of Engineers.

He has also been active in many civic affairs: past president of the Y. M. C. A.; director and past president of the University Club of Albany; member of many committees; vice-president of Rotary International.

C. Reeve Vanneman '03

for utmost service to the Nation

In these critical times, communications play a vital part in defense. Here is how the Bell System is organized to meet its great responsibility.

American Telephone and Telegraph Company coordinates all system activities, advises on telephone operation, searches for improved methods.

24 associated operating companies provide telephone service in their respective territories.

Long Lines Department of A.T.&T. interconnects the 24 operating companies, handles Long Distance and overseas service.

Bell Telephone Laboratories carries on scientific research and development for the system.

Western Electric is the manufacturing, purchasing and distributing unit.

Highly trained through many years of working together, these Bell System companies provide a nation-wide, unified service. Never have the benefits of this system been so clear as today when the country is under pressure.

Dollar-a-Year Men

(*Continued from page 6*)

ial in bulk in the following order of priority: (1) Army and Navy requirements; (2) defense-aid needs; (3) economic warfare needs; (4) civilian needs. The detail work of assignment will be done as heretofore by the OPM. The foregoing is cited largely to point out the complexity of the problems involved and the reason for progressive changes in the defense set-up as new problems develop.

The object of priorities is to insure that defense plants have first call upon all materials and facilities needed for the prosecution of their work and to distribute what may remain with fairness and with a view to causing as little disruption of private industry as possible. The priorities group operates in close contact with the Army and Navy Munitions Board which has established the relative importance of defense work through a series of ratings, A-1, A-2,—A-10. The priorities division has the power to place any material or manufacturing facility such as machine tools under complete control, assigning all or part of these to defense work, as the needs may require. This is a far-reaching function as it gives power of life or death over many non-defense industries. The Labor Division under Mr. Hillman is greatly interested in the problems of unemployment due to shifts in industry and also in the training of men for rapidly expanding industries such as airplane plants.

Other Divisions

The Division of Purchases assists in the vast purchasing activities of the defense program, insuring that prices are fair and advising as to sources of supply. The Production Division is concerned with the many problems of increasing the output of all manner of commodities. It is called upon also to find and secure tools and equipment for special needs as in setting up new defense projects such as production of tanks or guns.

Now it will be obvious to anyone with any knowledge of modern industry that the number of men in the country competent to administer intelligently and to operate a program such as outlined in the foregoing is comparatively limited. They are not to be obtained through civil service examinations nor, in general, through political appointments, nor are they in general to be attracted by governmental salaries. No doubt there are many salaried men among the hundreds in OPM who are receiving as much or even more than they can obtain in private life. But dollar-a-year men receive a per diem allowance of $10 which covers expenses for the ordinary individual away from home but is not adequate for men of the higher rank. They are also allowed travelling expenses from their home town to Washington and return. Any worthwhile man who accepts such an appointment must make financial sacrifices unless the organization with which he is connected in private life subsidizes him, as is often the case, or unless he has private means of support. Furthermore, men who accept positions of high honor and trust in such matters must expect ample criticism amounting often to abuse. In this respect the leaders of OPM have not been disappointed and the entire group now numbering about 200 must feel at times that their tasks are thankless efforts.

What then is the inducement for men to assume these difficult duties? As I view it there are two principal reasons. The first is the desire to do a patriotic service. My personal observation is that this desire is foremost in the minds of those with whom I have had personal contact. The second is the desire on the part of these men and of the industrial interests they represent to have industry do this difficult task well, rather than have government assume control and thus perhaps change permanently the relations between industry and government. This is a wholly laudable desire in which all men must concur if totalitarian methods are to be avoided. In establishing OPM the President has provided the means of making this desire effective.

Dollar-a-year men are selected with great care. The nomination is usually made by the director of a division and the nominee is carefully investigated by the Federal Bureau of Investigation. This is as it should be, for none but those of undoubted loyalty should be trusted with this work. Finally, the nomination must be approved by the President. It is no small honor to be a dollar-a-year man. At the end of the fiscal year, June 30, he receives an actual salary check for his services proportionate to the time of his employment. This check can now be retained permanently. The writer's check for forty-five cents received for a little less than six months' service is autographed by E. R. Stettinius, Jr., and will remain a much valued reminder of a strenuous and interesting experience.

President's Message

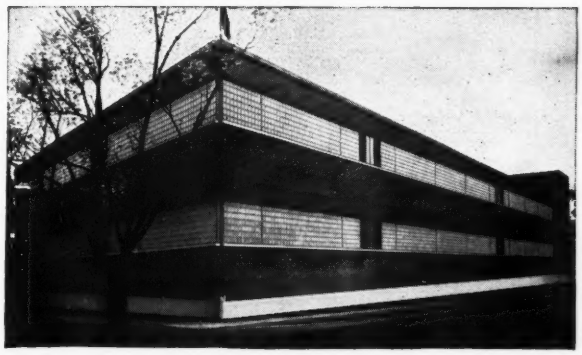
(*Continued from page 18*)

did not offer a single opportunity for further training in these essentials. In fact, some of these subjects were even held in scorn by those responsible for the curricula. It is gratifying to see that there is some improvement now, but there is not enough. The engineer who is possessed of an ability to express himself orally and in writing clearly, concisely, and cogently, is the one who will be most in demand. He is the one who will be able to sell himself and his ideas, and in most cases the one who will outdistance his fellows who have spent many hours pursuing tedious laboratory work or delving into the realms of science higher than will reasonably be required for the type of work which he may choose to do. Such men will form the bulwark of our nation, such men will continue our heritage of initiative—men who will be able promptly to see through impossible and reactionary and visionary schemes; who will promptly sift the wheat from the chaff in the mass of things offered for the good of the country by untrained upstarts; who will be the leaders so much needed to save our freedom of thought and action.

So in this salutatory message, I urge that you give thought to your training, the impelling reasons for it and the manner in which you acquire it. Take heed that you do not become submerged in the mass of data which will be put before you. Remember that an operative mind is the greatest asset you can have.

Yours very truly,

C. REEVE VANNEMAN



GTD Leadership is Recognized

To meet the shortage of accurate gages necessary to keep America's defense program in high gear, the government called on "G.T.D. Greenfield" to build additional plant capacity for the manufacture of these vital measuring tools.

What better proof of the accuracy and reliability of tools bearing the world-famous "G.T.D. Greenfield" trade mark shown above?

GREENFIELD TAP AND DIE CORPORATION GREENFIELD MASS.

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TAPS • DIES • GAGES • TWIST DRILLS • REAMERS • SCREW PLATES • PIPE TOOLS

AMERICA'S STURDIEST BABBITT METAL TAPES

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The extra tough steel lines are white metal coated and markings are deeply stamped into Babbitt Metal. You can't beat them for dependability and durability.

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Animated Advertising

(*Continued from page* 11)

100,000 times the size of the 16 mm. film mentioned at the beginning of this article.

The latest development in Epok is a system for coloring the animated cartoons. On the evening of Sept. 6, the Wilson sign blossomed out in four colors, and as this goes to press, technicians are still working on perfecting this first installation.

The transition to color was made as follows: Three-fourths of the white lamp bulbs were replaced by green, red, and yellow bulbs—all colors evenly distributed throughout the sign. When inking in the squared drawings, the animators know just which squares correspond to each color bulb. For example, if green grass is desired, the squares for red, white, and yellow bulbs are blacked out. For the black colored characters themselves, all four colors are blacked out on the drawing. To get the added precision necessary for this work, 35 mm. film is being used instead of the 16 mm. film used previously.

Although the principles of Epok are simple enough, a "spectacular" is really a very costly and complex mechanism. In fact the design, installation, and maintenance are all of such complicated and specialized nature that the Leigh Company retains control of all three phases and sells them as a service much as telephones are rented out. A customer can buy any size Epok spectacular of any design at a flat rate of so much per square foot per hour. Signs are leased for a minimum of three years and cost from $1,500 to $15,000 a month.

Troubleshooters

A squad of men nightly patrol the area from Times Square to Columbus Circle replacing burned out or flickering bulbs. "Smallpox" to these workers means that too many bulbs are burning out in a sign—faster than they can be replaced. Once a sign on Times Square had a chronic case of smallpox; a half-hour after new bulbs had been put in large dark splotches appeared on the sign. Finally the trouble was tracked down. A Yale freshman, in town for the weekend, was giving a cocktail party in a hotel across the street. He was astounding his guests by shooting out the bulbs with an air rifle.

Technically, a spectacular is a sign involving more than 200 feet of neon tubing or an equivalent light value in electric bulbs. A good sign need have two and only two characteristics. It must attract attention and have memory value. Animation is sure-fire, because everyone is amused by things that move.

Every animated cartoon sequence so far produced has had some sort of chase in it—usually a little or timid animal barely escaping from a large one. Snakes, however, have never been used. Leigh says, "There are many people to whom even a comic snake is repulsive."

So much is known about electric sign advertising that it might almost be called a science in itself. For instance, plenty of red neon tubing is put in signs planned for men; women are more attracted by blue. Broadway can no longer truthfully be called the Great White Way—it is now the Great Red, White, and Blue, Green, Yellow, and Purple Way.

PROFESSOR ERDMAN

(*Continued from page* 17)

of assistant professor of mechanical engineering at Robert College in Constantinople, Turkey. This crossing of the Atlantic was also a honeymoon voyage, as Mr. Erdman was married just before leaving.

Eight years of teaching at Robert College instilled in Professor Erdman the desire for more advanced study; so in the fall of 1936 he came to Cornell University on the Sibley Fellowship and began working for his master's degree by conducting research on hydraulic or jet propulsion of ships. His findings here revealed that previous attempts to put this theory into practice failed because of inadequate pumping mechanisms. This fact led directly to his investigation of propellor pumps for his Ph.D. degree, which was conferred on him last June after four years of diligent study. His hobby of photography came into practical use in illustrating his thesis with photographs of the pump apparatus.

PROFESSOR MALTI

(*Continued from page* 17)

Georgia Tech. On his way from New York to Georgia he first became acquainted with Jim Crow cars; he tells of taking a southbound train out of Washington and being approached by trainman and conductor both explaining to him that it was not proper for him to sit in the same car with colored people. Confused, Professor Malti could not understand why in a democracy like this persons should be discriminated against because of their color. He received his B.S. in E.E. in 1922 and shortly thereafter came to Cornell where he obtained his M.E.E., followed in 1927 by a Ph.D. He became an American citizen by naturalization in 1926.

Activities

He has an enviable list of honorary societies; included are Tau Beta Pi, Phi Kappa Phi, Eta Kappa Nu, and Sigma Xi. Incidentally, he served as local president of Phi Kappa Phi for the year 1936-37. In addition he was a member of the AIEE and active on several committees within that organization.

Defense work has made great demands upon his time. For the past three years he has served the government indirectly by assisting the Elliot Company, manufacturers of electrical machinery and power plant equipment, in their defense efforts. He is also at present engaged in some confidential research work for the government in connection with defense.

Ask Professor Malti what he likes to do best and he will tell you writing books, papers, and engaging in research. You will agree with him as you progress further into electricity, for he has written many technical books in his field and has a list of over twenty technical papers which report his research at Cornell. Photography, gardening, and reading non-technical literature—especially Dickens's novels—are his favorite avocations.

His duties as class adviser will include the selection of proper schedules for you freshman students and assisting you with your difficulties.

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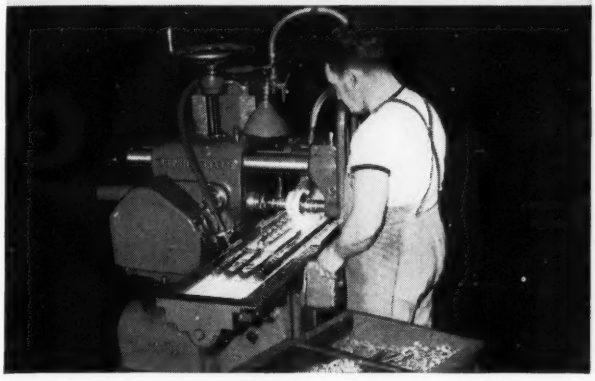

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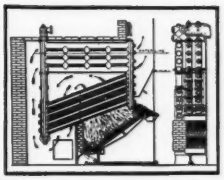
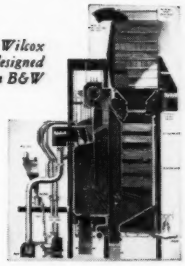


The original Babcock & Wilcox Water Tube Boiler—designed in 1867—and a modern B&W Boiler.



The PROGRESS OF POWER

Here are some of the major developments in the history of steam generation since 1867:

Water-tube boiler • Pulverized coal firing • Welded drums • Stud-tube, water-cooled furnace walls • Open-pass boiler • Two-stage furnace • Slag-tap furnace • Advances in working pressures, from 650 lb. in 1922 to 2500 lb. in 1940.

Each of these developments was either originated by B&W or first made commercially acceptable by B&W, the oldest and largest manufacturer of steam boilers in this country.

Much of the knowledge of steam generation that is now incorporated in your own textbooks has been given to the world by B&W engineers.

FREE 14-PAGE BOOKLET

"The Design of Water-Tube Boiler Units". This liberally illustrated booklet discusses the factors involved in determining the proper type of steam generating unit for any given service. A copy will be sent to you on request.

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The ENGINEER *Comments:*

Cornell Placement

AT the annual dinner of the Cornell Society of Engineers, C. R. Beardsley, President of the Yale Engineering Association, said of Cornell placement work:

> "In a study of alumni employment work among various universities, the service to Cornell men stands out as exceptionally well done. Particularly when direct placement is impossible, advice and help in building up the self-respect of an unemployed person frequently enables him to go out on his own initiative. The Yale Committee believes this to be of greater importance perhaps than the direct placement."

This statement brings to light the excellent work of Mr. Herbert Williams '25 and Mr. Paul O. Reyneau '13. Mr. Williams is connected with the Cornell University Placement Bureau at Ithaca and Mr. Reyneau is the placement director for the New York City area. A survey of the data on the Alumni page brings forth the reason for Mr. Beardsley's statement.

Ensigns and Cayuga

THANKS to E. A. Miller of Ithaca, Cayuga Lake entered into the very best of Navy tradition this past summer. Mr. Miller is the owner of the only Diesel-powered craft on Cayuga and he placed it at the disposal of the College of Engineering officials. The officials then placed the boat in the hands of the ensigns who were studying Diesel engines at the University. Three experimental cruises were planned by the faculty to give the Navymen instruction in navigation, seamanship, and the handling of Diesel engines under conditions afloat. Professor A. C. Davis, head of the Diesel course, points out that the engine has the same type of water cooling system, electric wiring, generator for lighting and refrigeration, and other equipment as would be found on a larger scale in the naval vessels to which the ensigns are assigned.

Before an ensign actually took a cruise on the boat, he was required to spend an entire morning studying the engine, making a chart of the water system, the electric wiring, and all the other elements that have a bearing on engine performance. On a typical cruise, which lasted from 10:30 a.m. to 4 p.m., an ensign spent part of his time in the engine room checking actual performance at different speeds, and also took a hand at navigating the craft. Finally, he was required to prepare a complete report on the equipment and operation of the boat.

Ex-navyman Dr. Arthur S. Adams (See CORNELL ENGINEER, Vol. 6, No. 2, p. 16) says of these cruises, "Such practical training as this is an essential part of the Diesel Engine course." The truth of this statement is obvious to any observer. It is not hard to imagine that Dr. Adams experienced a certain amount of nostalgia when the boys put their ship out on Cayuga. Nor is it difficult to visualize Dr. Adams aboard the cruiser reminiscing over his own days in the Navy.

Across From Willard Straight

THERE are certain things about the situation of Olin Hall which attract our interest. The removal of the chemical engineers from the north end of the Quadrangle will cause many sighs of relief from the remainder of the engineers. The scholarly atmosphere which radiates from the average chem engineer has always been a sore point with the boys of Sibley and Lincoln. And as for the ChemEs' attitude in this matter—why bother?

Looking at the situation from the standpoint of the proverbial unbiased observer, we find that Olin Hall is doing a good job of hiding the architectural eccentricities of Sage College. On the other hand, if by some rare misfortune, one does get a glimpse of both Sage and Olin at the same time, the admixture is strikingly gruesome—in one swift glance, the observer sees the beginnings and the end of architecture at Cornell. Speaking of architecture, the average arts student still insists that Olin Hall looks like a factory.

And, of course, Willard Straight is much more convenient. This is of some consequence to "Dusty" Rhodes, best known for his ability to graduate small classes and shoot large scores in billiards. Estimating a saving of five minutes of walking time each day, Dr. Rhodes will be able to put about one hour more each week into billiards.

Perhaps the best effect of the new location will be the proximity of Barnes Hall and Sage Chapel. At least the ChemEs will know where these buildings are, which will be an extreme broadening of their intellectual horizons.

Coming Up

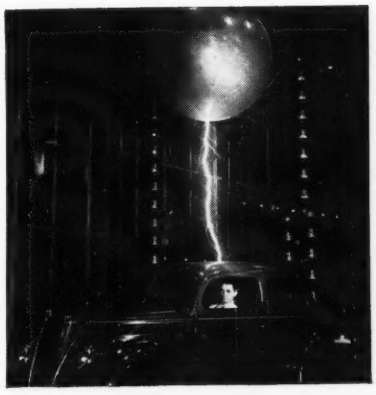
THERE are many times in the life of an undergraduate when a smile from one of the young ladies outside the office of a School Director has helped a lot to tone down the sting of a good dressing-down. The ENGINEER suggests that you turn to this page in our next issue to learn more about these people—where they are from, their training, and how they manage to smile in the presence of such a great deal of knowledge.

* * *

They say frequent drinking of water will prevent stiffness in the joints. The trouble is most of the joints don't serve water.

What do you know about electricity?

Check the correct answers to the questions below and see how many of these Westinghouse engineering activities you know



LIGHTNING EXPERIMENT

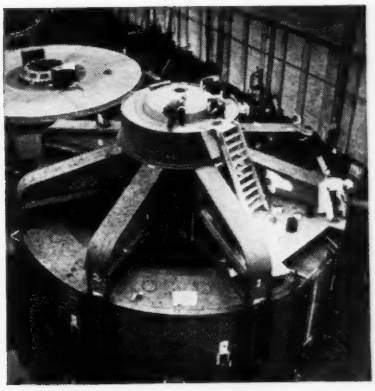
Recently, a Westinghouse engineer sat in his car while a 3,000,000-volt bolt of artificial lightning struck it. He was safe because the car body acts as:

1. *A Helmholtz bell*
2. *A Faraday cage*
3. *A Maxwell's demon*
4. *A Wilson cloud chamber*

MASS SPECTROGRAPH

This mass spectrograph, used by engineers at the Westinghouse Research Laboratories, performs one of these functions:

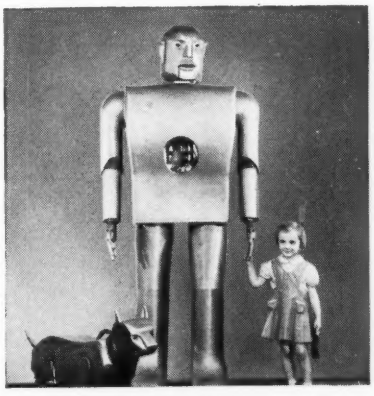
1. *Sorts atoms according to mass*
2. *Reveals spectra of stars*
3. *Produces U235*
4. *Measures amount of oxygen in air*



BIGGEST GENERATORS

Pictured above during construction is one of the three largest water-wheel generators in the world. All three are Westinghouse-built. Each will produce 108,000 kva, and is made for:

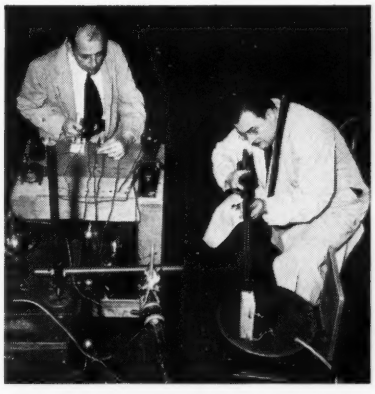
1. *Boulder Dam*
2. *Passamaquoddy*
3. *Dnieperstroy*
4. *Grand Coulee*



MECHANICAL MAN

This is the latest of a series of mechanical men made by Westinghouse engineers. He walks, talks, smokes cigarettes, raises his arms, counts on his fingers, distinguishes red and green lights. His name is:

1. *Volto*
2. *Mephisto*
3. *Elektro*
4. *Sambo*



FAST X-RAY

Westinghouse research engineers have developed a motion-stopping X-Ray that operates in:

1. *200th of a second*
2. *40th of a second*
3. *100,000th of a second*
4. *1,000,000th of a second*

PRECIPITRON

The Westinghouse Precipitron removes 95% of the solid matter from the air, including particles as small as pollen, microscopic dust, and smoke. It works by:

1. *Law of inverse squares*
2. *Capillary action*
3. *Infiltration*
4. *Electrostatic attraction*

HOW DID YOU DO?

Here are the answers. If you got 4 out of 6 of these Westinghouse activities right, you did O.K. If you got 5 out of 6 right, you deserve a cum laude. If you got all of them right, you're amazing.

Westinghouse

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Lightning Experiment . . . A Faraday cage
Mass Spectrograph . . . . . Sorts atoms according to mass
Biggest Generators . . . Grand Coulee
Mechanical Man . . . . Elektro
Fast X-Ray . . . 1,000,000th of a second
Precipitron . . . Electrostatic attraction

The ALUMNI

(*Continued from page 15*)

CIVIL ENGINEERS

Au, H. T. — U. S. Civil Service Commission at Pearl Harbor
Baird, W. C. — Pennsylvania Railroad
Boardman, W. W.
Brennan, V. A. — Service
Campbell, R. L. — U.S.N.R.
Causey, E. D. — Employed, where?
Clark, R. T. — U. S. Army, Quartermaster Corps
Dahmen, H. B. — Panama Canal
Davis, R. G. — Dravo Corp.
Ecberlin, H. F. — American Bridge Co.
Howe, W. — Panama Canal
Hubbard, R. A. — U.S.N.R.
King, E. B. — Carnegie-Illinois Steel Corp.
Lansing, W. — Chicago Bridge and Iron Co.
Levine, A. — U. S. Army, R.O.T.C.
Lynah, H. P. — Dravo Corp.
McElwee, R. F. — Carbide and Carbon Chemical
Miller, D. J. — U.S.N.R.
Odenbach, C. F. — Panama Canal
Perez, I. A. — Returning to South America
Rechen, H. J. — Panama Canal
Redington, T. J. — Panama Canal
Schwartz, F. W. — U. S. Army, Ordnance Dept.
Scott, R. R. — Panama Canal
Simmons, P. C. — Socony-Vacuum Oil Co.
Spohr, H. N. — U. S. N. R.
Symons, J. R. — American Steel and Wire Co.
White, E. P. — American Magnesium Corp.
Shaw, W. B. — Turner Construction Co.

ELECTRICAL ENGINEERS

Brown, S. K. — Lockheed Aircraft Corp.
Buttram, D. R. — General Electric Co.
Cotsworth, A. — Zenith Radio Co.
Don, W. C. — Chrysler Corp.
Foote, P. C. — Cutler-Hammer, Inc.
Foster, E. L. — Lockheed Aircraft Corp.
Friedrich, E. E. — E. H. Friedrich Co.
Hagedorn, A. A. — Public Service Electric and Gas Co.
Himrod, V. J. — U. S. Army, R.O.T.C.
Juhnke, C. J. — U. S. Army, Ordnance Dept.
Kesselring, K. A. — U. S. Army, Ordnance Dept.
Klinger, A. T. — American Viscose Corp.
Lawrence, R. A. — Service
Meachem, J. R. — Lockheed Aircraft Corp.
Muchmore, T. F. C. — Philadelphia Electric Co.
Newman, R. J. — General Electric Co.
Nichols, E. D. — General Electric Co.
Reiter, C. G. — Western Electric Co.
Ross, D. G. — General Electric Co.
Salabes, M. K. — U. S. Army, Signal Corps
Strempel, E. L. — General Electric Co.
Sturtevant, C. E. — General Electric Co.
Swazey, E. H. — Bakelite Corp.
Turner, S. N. — Western Electric Co.

MECHANICAL ENGINEERS

Amsler, F. D. — Aluminum Co. of America
Barrows, J. G. — E. I. duPont, Nylon Plant
Bellows, J. C. — Lockheed Aircraft Corp.
Boak, C. E. — U. S. Army, Ordnance Dept.
Bosson, A. D. — Gleason Works
Bradt, D. M. — General Electric Co.
Cuniberti, V. — Thompson Products, Inc.
Dozier, E. W. — Vultee Aircraft Corp.
Dungan, R. T. — Aeroproducts Division of General Motors
Durbin, R. M. — E. I. duPont, Ammonia Division
Eldridge, C. C. — U. S. Army, Signal Corps
Fasting, J. H. K. — Bethlehem Steel Co.
Frank, R. M. — U. S. Army, R.O.T.C.
Gifford, W. E. — New Departure
Haase, R. W. — Babcock and Wilcox Co.
Hagar, W. T. — Fleetwings Aircraft, Inc.
Hart, Barbara G. — Will be married
Hayes, C. V. — U.S.N.R., Bureau of Aeronautics
Horsfall, W. P. — Lockheed Aircraft Corp.
Hough, L.A.S. — Glenn L. Martin Co.
Hoyle, R. J. — Remington Arms Co.
Hutchinson, F. E. — U. S. Army
Irish, S. R. — Cutler-Hammer, Inc.
Knowlton, R. — Service
Konstan, P. — Shell Development Co.
Leinroth, J. P. — Standard Oil Co. (Ohio)
Magalhaes, J. A. — Glenn L. Martin Co.
Mills, F. Westvaco — Chlorine Products Corp.
Mongello, T. — American Can Co.
Munschauer, F. E. — Niagara Machine and Tool Works
Nelson, N. T. — Bethlehem Steel Co.
Northup, R. P. — Vultee Aircraft Corp.
Ohaus, R. E. — Hamilton Standard Propellers
Robinson, K. S. — Lockheed Aircraft Corp.
Rodgers, E. N. — Bethlehem Steel Co.
Scholes, F. — Goodman Mfg. Co.
Severinghaus, W. J. — Lockheed Aircraft Corp.
Simmons, J. A. — U. S. Army Air Corps
Sterling, J. C. — Hamilton Standard Propellers
Stimson, R. L. — Lockheed Aircraft Corp.
Sussman, D. — Service
Trout, N. S. — Eclipse Machine Co.
Truszkowski, B. S. — U.S.N.R.
Van Arnam, W. D. — Glenn L. Martin Co.
Walker, A. E. — General Electric Co.
Watson, R. S. — Glenn L. Martin Co.
Zink, J. H. — General Electric Co.

ANALYSIS OF THE PLACEMENT

Includes those taking graduate work and with offers outstanding

Class	Number in Class	Positions Accepted	Graduate Work	Offers Outstanding	Number Unemployed	Percentage Placed
Administrative						
Electrical	5	5	0	0	0	100.0%
Mechanical	46	45	1	0	0	100.0%
Chemical	16	13	1	0	2	87.5%
Civil	29	28	0	0	1	96.5%
Electrical	24	24	0	0	0	100.0%
Mechanical	47	45	0	2	0	100.0%
Totals	167	160	2	2	3	98.3%

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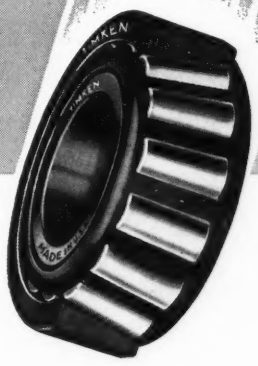
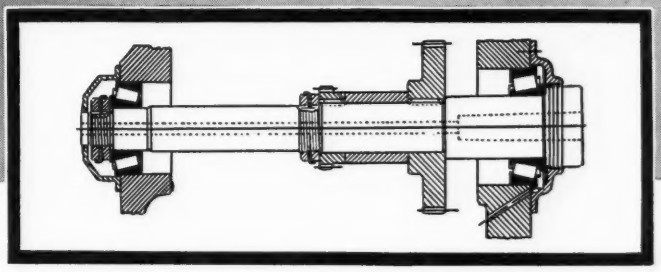
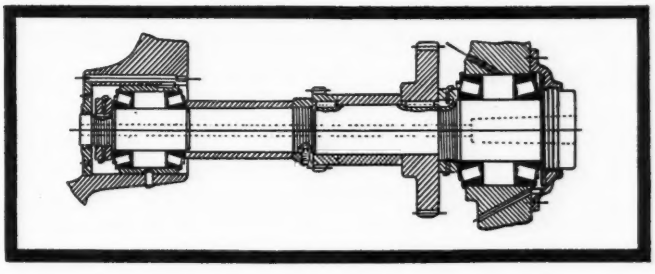
Ralph Wing
214 E. State Dial 31370

What bearings would you specify for a Machine Tool Spindle?







Suppose you were designing a heavy-duty lathe for precision work—where tolerances as close as one ten-thousandth of an inch had to be held; where heavy cuts would be the rule. How would you mount the work spindle?

If you knew your bearings you would mount the spindle on TIMKEN Bearings front and rear. Then you would be assured of permanent spindle rigidity; freedom from chatter under any cutting load; any spindle speed; any rate of feed. In other words, *accuracy*. The spindle would turn smoothly because there would be no friction to hamper its movement. Power demands would be lower. Radial, thrust and combined loads would be carried safely under all operating conditions.

By following the above procedure you would be doing what an overwhelming majority of the leading heavy-duty machine manufacturers have been doing for a long time.

If you would like to know more about the application of TIMKEN Bearings in all kinds of machine tools as well as in many other kinds of equipment write for a free copy of the Timken Reference Manual. Know your bearings—be a better engineer.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; and TIMKEN Rock Bits.

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Smokadors	$1—$10.50
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Turkish Towels	5 for $1
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I.E.S. Table Lamps	$2.29
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Liquors

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Buy a Case

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The COLLEGE

(*Continued from page* 13)

DALL, Cornell's expert on gelatin photoelastic models (See article in the CORNELL ENGINEER, Vol. 6, No. 3, p. 8) He will remain on leave for a year.

Also on leave is C. W. TERRY, assistant professor of experimental engineering.

Some Summer Activities

At Ann Arbor, the town that the University of Michigan is in, the Society for the Promotion of Engineering Education held its annual meeting. DR. ARTHUR S. ADAMS, professor of mechanics and Assistant Dean, was chairman of the mechanics division and PROFESSOR W. E. STANLEY of the CE School was chairman of the section on sanitary engineering. Main speaker at the annual dinner of the Mechanics Division was PROFESSOR J. N. GOODIER. PROFESSOR PAUL H. BLACK was also present at the meeting.

When the AIEE got together for their Summer Convention in Toronto, Cornell was well represented. DIRECTOR W. A. LEWIS, JR., of the EE School took part in the meetings of the Committee on Standards and the Subcommittee on Transformers; PROFESSOR M. G. NORTHROP attended as official delegate for the Ithaca Section of the AIEE; PROFESSOR E. M. STRONG took part in a special conference in which he helped to organize methods of lighting industrial plants as a protection against sabotage; PROFESSORS L. A. BURCKMEYER, JR., and J. P. WOOD were also present.

Besides being a main speaker at the Ann Arbor meeting, Professor Goodier presided at the meeting on Elasticity and Plasticity at the national meeting of the Applied Mechanics Division of the ASME PROFESSORS H. C. PERKINS and M. V. BARTON were also in attendance.

Construction and Changes

Buildings

Upon walking into Sibley Dome, one is aware of an entirely new office set-up. The Dean and the new Assistant Dean have completely remodeled offices, and the large amount of space formerly devoted to waiting purposes has been converted into an office for the new secretary to the Dean, Miss Page.

Not as conspicuous as Olin Hall is the new High-Voltage Laboratory taking shape under the guidance of Dr. W. A. Lewis. The steel structure is completed and the sheet metal covering is being placed on the sides. According to Dr. Lewis' estimate, the building should be completed in two months, at which time installation of equipment will begin. Interestingly enough, the priority situation did not seriously affect the obtaining of the large equipment, but it has played havoc with the smaller materials. Professor Agar should be able to move into the new laboratory by Christmas time. Professor Agar is at Cornell for the first time this year.

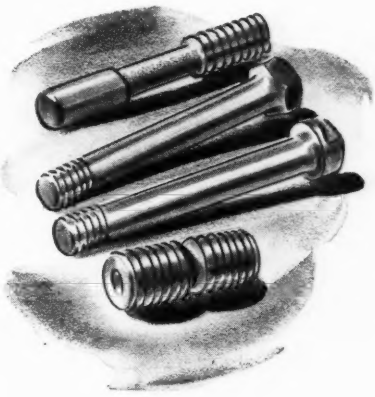
And the carpentry building in back of Franklin has been remodeled into a new laboratory. As this is being printed, the signmakers

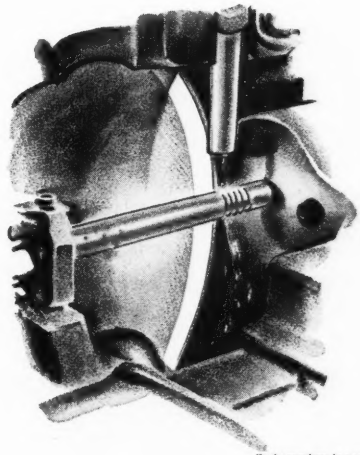
(*Continued on page* 30)

What holds a dive bomber together at 500 M.P.H.?

The answer is design and construction and materials and craftsmanship. But accuracy and finish of parts are also important in building a plane to withstand terrific speeds and that depends on grinding. Vibration is minimized by grinding all moving parts of the power unit to extreme accuracy. Safer and stronger threaded parts are ground with special grinding wheels such as are made by The Carborundum Company.

Grinding of threads from the blank is a comparatively new development. Threads that are ground to an almost unbelievable accuracy, free from microscopic checks and cracks! Grinding wheels for airplane manufacture constitute only one of many contributions made to industry by Carborundum during its fifty-year existence.





In fact there isn't an industry that has not been benefited by grinding. No matter what industry you go into after graduation, you may run into a grinding problem. And Carborundum Engineering Service will be ready to help you solve it! The Carborundum Company, Niagara Falls, New York.

CARBORUNDUM
REG. U.S. PAT. OFF. BRAND
ABRASIVE PRODUCTS
50 YEARS OF SERVICE TO ALL INDUSTRY

Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company.

The COLLEGE

(*Continued from page* 28)

are making a sign which will read, "Engineering Laboratory Annex," the new name of the edifice. The basement of the building will be devoted to the civil engineers and the two floors above will be taken over by mechanical engineers, for research purposes.

Defense Courses

Approximately 480 men, most of whom are employed in defense industries in the Southern Tier counties or in the Buffalo area, received certificates from the College of Engineering at Cornell University last summer after satisfactorily completing courses under the Engineering Defense Training Program sponsored by the U. S. Office of Education. Many have already received promotions in the concerns employing them as a result of their increased effectiveness through special study.

As these courses come to a close, an extensive summer program was initiated, with 21 courses beginning the week of June 16 in Buffalo, Elmira, Binghamton, Geneva, and Ithaca. All courses were given in the evening, were of college grade, and students were admitted without tuition charge.

A total of 1520 students were enrolled in these summer courses which ended on September 20. This number is larger than the total enrollment in the College of Engineering in Ithaca. In recognition of their efforts, the students were granted certificates.

The development of the defense courses offered by Cornell has been a remarkable achievement, and all thanks go to the new Assistant Dean, Dr. Arthur S. Adams. Already bigger things are in the offing—on October 13, new 15 weeks courses will begin in nine different centers: Auburn, Binghamton, Buffalo, Corning, Elmira, Endicott, Geneva, Ithaca, and Sidney. Fifty-seven courses will be given, all pertaining to the defense industries. When this program first started, there were 480 men enrolled and there were only three centers of instruction. The scond stage saw the enrollment of 1520 students and five centers of operation. The third stage of this program will see nine centers of instruction and a probability of an increase in the number of students to 3,000.

PROFESSOR O'ROURKE

(*Continued from page* 16)

Society of Engineers and Architects on "The Role of Engineering Colleges in the Defense Program."

Golfing and deep-sea fishing are perhaps his two favorite sports; although he caught no marlin, Professor O'Rourke did catch an Hawaiian fish known as an *ono* which weighed a good thirty to forty pounds. (He assures us this is no fish story.)

While there he also cultivated another hobby—flying. After his son Bob had gotten his license, he talked his dad into taking up flying, and so now both father and son have "wings". Bob, incidentally, is entering the University this fall as a freshman in the ME school. He can well be proud of his father, and we hope he'll follow in his dad's footsteps.

Gifts

Make HEGGIES' your headquarters for gifts — Our stock of gold, silver, bronze, aluminum, silver plate, leather, watches, clocks, and precious stones is replete with unusual things and the price range is from $1.00 up and as high as you wish.

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Civil Engineering

1. General four-year course leading to the degree of Bachelor of Civil Engineering. Options are offered in Administrative Engineering, Sanitary Engineering, Structural Engineering, Hydraulic Engineering, Transportation Engineering, and Geodetic Engineering.
2. Six-year course leading to the degrees of Bachelor of Arts and Bachelor of Civil Engineering.
3. Four-year course in Administrative Engineering in Civil Engineering leading to the degree of Bachelor of Science in Administrative Engineering.

Mechanical Engineering

1. General four-year course leading to the degree of Bachelor of Mechanical Engineering. Options are offered in the senior year in Power-Plant Engineering, Heat Engineering, Industrial Engineering, Automotive Engineering, Aeronautical Engineering, and Hydraulic Power-Plant Engineering.
2. Five-year course leading to the degree of Bachelor of Mechanical Engineering.
3. Six-year course leading to the degrees of Bachelor of Arts and Bachelor of Mechanical Engineering.
4. Four-year course in Administrative Engineering in Mechanical Engineering, leading to the degree of Bachelor of Science in Administrative Engineering.

Electrical Engineering

1. General four-year course leading to the degree of Bachelor of Electrical Engineering.
2. Six-year course leading to the degrees of Bachelor of Arts and Bachelor of Electrical Engineering.
3. Four-year course in Administrative Engineering in Electrical Engineering leading to the degree of Bachelor of Science in Administrative Engineering.

Chemical Engineering

1. Five-year course leading to the degree of Bachelor of Chemical Engineering.

Graduate Work

Courses leading to the Master's and Doctor's degrees are available in all the above fields.

Engineering Research

Facilities are available for conducting fundamental and industrial researches in the foregoing fields in cooperation with industries.

For Detailed Information, Address
The Dean of the College of Engineering, Cornell University
Ithaca, New York

STRESS and STRAIN...

A tourist traveling through the Texas panhandle got into a conversation with an old settler and his son at a filling station.

"Looks as though we might have rain," said the tourist.

"Well, I hope so," replied the native, "not so much for myself as for my boy here. I've seen it rain."

* * *

"I hear you son's at college."

"Yep."

"How's he doing?"

"Pretty good, I guess; he's taking three courses. I've just paid out ten dollars for Latin, ten dollars for Greek, and a hundred dollars for Scotch."

* * *

Sweet young coed: "Professor, do you think it's right for me to sit on your knee while you explain your theory of reincarnation?"

Prof: "Why in hell not? We only live once."

"What kind of a dress did Hazel wear at the party?"

"I think it was checked."

"What kind of a party was it?"

* * *

They were training Mandy in her duties as maid. Upon answering the phone the first day she brought no message but explained: "Twarn't nobody, jes a man says, 'It's a long distance from New York,' and I says, 'yes sir, it certainly is'."

* * *

"Only last week you said it was a great life if you didn't weaken."

"Yes, but since then I've found out it's greater one if you weaken just a little bit."

* * *

Hotel Page: "Telegram for Mr. Niedspondiavanci, telegram for Mr. Niedspondiavanci!"

Mr. Niedspondiavanci: "What initial, please?"

—*Cut courtesy* EXCAVATING ENGINEER

"Sorry, Miss, but we just can't seem to find your bathing suit."

An old Southern colonel was making a trip through Turkey and one day hired a guide to take him on a personally conducted tour of the Sultan's harem. While wandering around through the halls he suddenly recognized a burly black negro attendant as a former hand on his Southern plantation.

"Well, Sam," exclaimed the surprised colonel, "what on earth are you doing away over here?"

"Well, suh, boss," replied the grinning negro, "Ah'll tell you. Ah has de best job in de worl'. Every day ah sits heah in front o' dish yeah do' way. Ah has a bowl o' watah in mah hand an' when dat long line o' beautiful gals wat belongs to de Sultan passes by, ah dips mah fingahs in de watah and trows it on 'em. When ah comes across one wat sizzles—ah is all done fo' de day!"

* * *

A recession is a period in which you tighten up your belt.

A depression is a time in which you have no belt to tighten.

When you have no pants to hold up it's a panic.

* * *

Here's what happened to one of last year's seniors:

After a heated argument with his younger brother, the elder one sought to prove his point.

"I ought to know. Didn't I go to the University, stupid?"

"Yes, and you came back the same way."

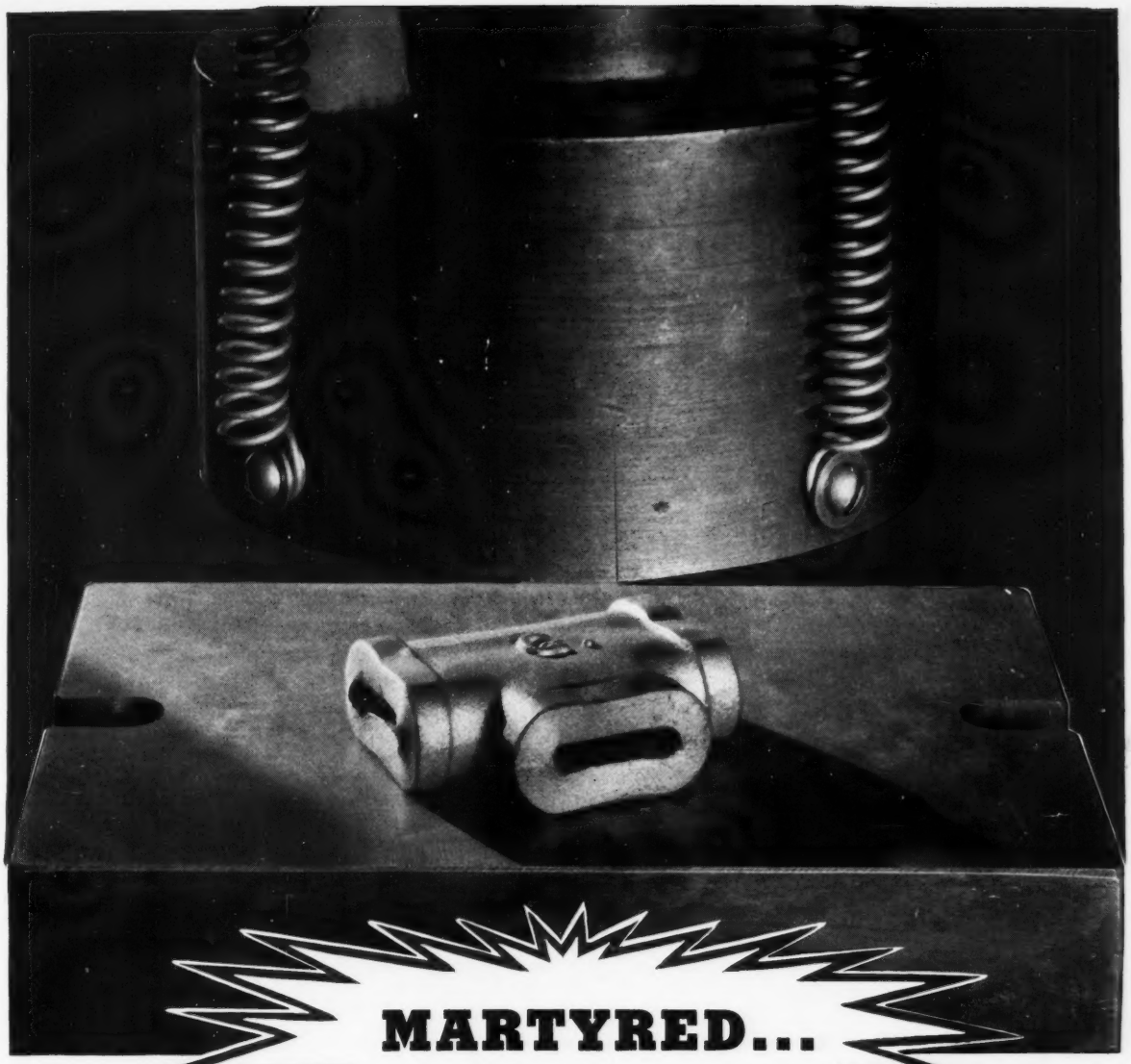
* * *

A colored preacher at the close of his sermon, discovered one of his deacons asleep. He said: "We will now have a few minutes of prayer. Deacon Brown will lead."

"Lead!", said Deacon Brown, suddenly awakening, "I just dealt."

* * *

She was pensive when I met her,
Sadness was on her brow.
But my checkbook made her happy,
And she's ex-pensive now.



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To Make Pipe Fittings Serve You Better!

Relentlessly, the pressure indicator moved past 5,000 . . . 10,000 . . . 20,000 pounds. Not until it reached 21,350 pounds, did this ¾" Grinnell Tee completely flatten out . . . sacrificed to prove the superior qualities of Grinnell Malleable Iron Fittings.

Even more important than the extra strength, this ruthless test shows the super-toughness Grinnell Malleable Fittings possess because they're made from Air-Furnace metal. For, the Grinnell Fitting merely *flattened out* at terriffic pressure, where poorer quality fittings shattered into fragments at only 16,500 pounds!

Whether they serve on your household water pipes or in heavy-duty systems, Grinnell Fittings give you extra safety margin and extra assurance against trouble. This is but one typical example of the extra service values that consistently go with Grinnell Products . . . automatic sprinkler fire protection systems, prefabricated piping, unit heaters and others, alike. It illustrates why Grinnell is the outstanding name "Whenever Piping Is Involved"! Grinnell Company, Inc., Executive Offices, Providence, R. I. Branch offices in principal cities.

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GRINNELL

WHENEVER **PIPING** IS INVOLVED

G-E Campus News

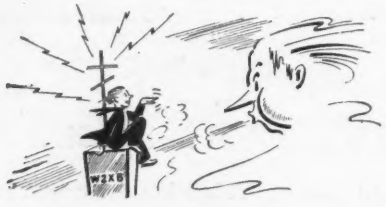
I KNOW!

IF THE steel for an automobile travelling between Chicago and Los Angeles at 60 mph was cold-rolled at a speed of 42 mph, how far is it from Bangor, Maine, to Bankok?

So far as we know there's no answer to this problem. But then, a few years ago there was no answer to the problem of cold-rolling steel strip at these speeds either.

G-E amplidyne control solved this problem, enabling a Pennsylvania steel plant, the largest, highest-powered cold-rolling mill for tin-mill products in the world, to roll out strip at speeds up to 3850 feet per second, or more than 43 miles per hour!

G-E motors to the tune of 11,400 hp respond to the precision control of G-E amplidyne circuits in driving the rolls of the mill at this speed.



TELEBOX

WHEN Dame Nature goes to work on a television antenna with rain, sleet, and snow, she can cause no end of transmission trouble.

G-E television engineers, however, circumvent weather changes by housing the antenna within an electrically heated box. This prevents seeping moisture from freezing on the antenna during cold weather and interfering with the normal patch of high-frequency current flow.

The antenna, at the top of a 128-foot transmitting tower in the heart of Schenectady, relays the picture waves to G.E.'s main transmitting station in the Helderberg hills 12 miles away.

On top of the box for relaying the accompanying FM sound is another antenna which also acts as a lightning rod to protect the tower and relay equipment.

RESEARCH INC.

HOW a heavy English bulldog and a brawny Irish washerwoman substantiated the findings of years of research is described with an order for fifty miles of Formex wire recently received by General Electric.

The customer was considering the use of Formex wire as a substitute for wire whose insulation had rotted after two or three years of use, exposing the bare copper. The railroad's signal engineer was "from Missouri" and wanted to see for himself whether Formex wire insulation could "take it."

Two 50-foot lengths were strung up. One was equipped with a metal ring, to which a bulldog was attached on a leash. The other became a washerwoman's clothesline. Several weeks later, after the bulldog had tugged against every inch of his wire and the washerwoman had pinched her wire with clothespins from end to end, the insulation of both lengths was still in perfect condition.

GENERAL ELECTRIC

963-24-211